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- The Best Free Alternatives To Paid Software
- Britain's Best Technology Products And Companies

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HOW DO TECHNOLOGY PRICES COMPARE TO THE USA?

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08 UK And US Prices

In the USA, bigger is better, but one thing that seems much smaller on the other side of the Atlantic are the price they pay for technology. Why, though? What is it about the UK that means we get charged more for our gadgets than our American cousins do? David Crookes has been looking for an answer to just these questions, as well as seeing whether you can actually save money by travelling abroad to buy things

18 Free Alternatives To Paid Software

Good software normally comes with a price attached, because it costs money to produce top-quality programs. That doesn't mean the free alternatives can't do a job for you, though. The question is: which programs should you trying out? Well, to help you make that decision, we've selected some of our favourite free software, comparing it to the paid alternatives

46 M.2 SSDs On Test

If you're looking for an upgrade that will make a real difference to your everyday computing, you can't go wrong with an SSD, and with the newer M.2 format, you're able to get even faster storage and into a much smaller space. David Hayward has been checking out six M.2 drives, to see which one deserves a space in your PC and which ones should remain on the shelf



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58 Best Of British



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58 Best Of British

When you think about technology development, some of the first places that come to mind are Japan, Korea and the US with its iconic Silicon Valley. What about right here at home in the UK, though? What technological wonders have been borne from these shores? Mark Oakley has been finding out in this special feature

64 Choosing A Monitor

If you choose a monitor simply by picking the largest, shiniest one you can go for, then you're probably missing out on a ton of features. You also need to take into account things like the refresh rate and the contrast ratio. These are just a couple of the attributes you'll have to concern yourself with, though, and it can quickly get confusing. So to guide you through the facts and figures and explain just what they mean, we've put together all the information you'll need to choose the right monitor for you

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David looks back at Windows 1.0

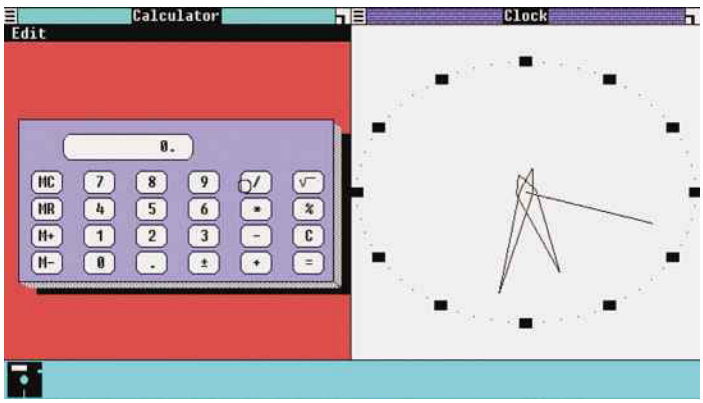
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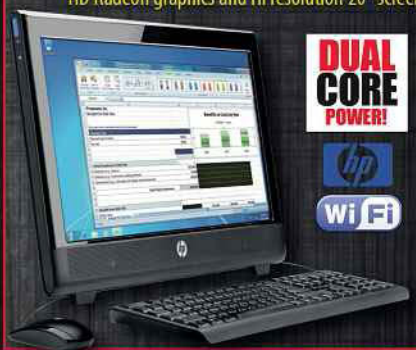
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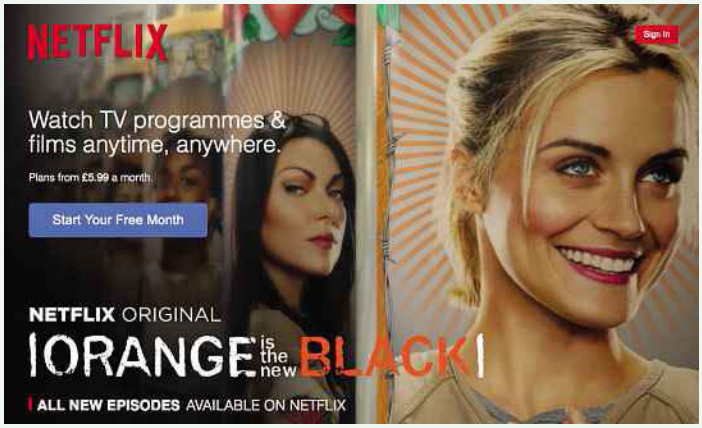
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Does The UK Pay More For Tech?

David Crookes look at price differences between the UK and the US, and whether the gap is closing





It's arguably not as good as the US version, but the UK Netflix service will cost you more

Brits can be a canny bunch when it comes to saving cash. Hundreds of thousands of people subscribe to weekly money-saving emails, many more use price comparison sites and price trackers, and there are also lots of apps that pick up where we are at any one time and point us to the bargains that are all around us.

> **"The price gap is getting narrower because we get fewer dollars for our money these days"**

But there is one bugbear that sticks in the back of the mind of many consumers: the feeling that we're still often paying more for our items than people who live in other countries. No matter how much we save, we cannot help but look enviously at the most notable of territories, the United States of America, where technological goods in particular sell at cheaper prices than in the UK.

The difference in price can sometimes run into the hundreds, and that has prompted thousands of people to look further afield when making a purchase. Seldom is this more noticeable than when Apple brings out something new and shiny, prompting newspapers to do a quick price comparison, and leading website commentators to pore forth with typical vitriol

INTERVIEW: Crossing The Atlantic

Patricia Davidson, author of *The Shopaholics Guide to Buying Online* and an online shopping consultant, discusses saving money by buying items in the United States.

Micro Mart: Why is there such a price difference between the UK and USA?
Patricia Davidson: Prices will always fluctuate because of the exchange rate. So when it was $2 to the pound, you got much better deals and now at 1.49 I think it's less good, but it's not bad.
MM: What should people do in terms of saving money?
PD: Buying items in America depends on what you want to buy, but you can price compare in the US. And if you go to a store like Best Buy or Target or Computer World or somewhere like that, you may find something at a better price, or you may find a slightly older model, which is in absolutely perfect nick but is on offer. You have far more offers in the US than you have here?
MM: Why are there more offers in America?
PD: It's a huge market, absolutely ginormous compared to here. I spend a third of my life in the US, and most things I buy over there. In terms of US sales tax, usually if you buy a laptop of headphones or something through Amazon.com, you don't have to pay tax, so it's cheaper to buy through Amazon most often.
MM: What about deliveries?
PD: The US won't deliver anything electrical to the UK as far as I know. I've never tried. But I bought my daughter an Apple Mac in the US, because it's usually dollars to pounds. A pair of Bose noise-cancelling headphones are £270 over here, but in the US they're $290. So it's extremely annoying if you're not in the US, but that's because the market is so huge. They won't stand for our prices, so the prices are lower. But you generally have to be there.
MM: Are we silly to put up with this?
PD: If you want an Apple Mac and you're here, then unless you get a friend overseas to buy it for you and send it, then there's absolutely nothing you can do. People will not stop buying en masse because of this in the UK if there is a product they desire. They will take the load.
MM: Have you ever had any problems at customs?
PD: I didn't pay duty on my laptop because I was using it, so I didn't even think of it. Customs aren't interested in people bringing in one pieces of equipment. They are interested in drugs and jewellery and things like at high prices. Something at a few hundred pounds they are not interested, but I was using my daughter's computer, and it didn't even cross my mind.
MM: Is there a way to getting close to US prices online in the UK?
PD: If you look for special offers and get lucky, but propriety branded goods will never be the same price like-for-like. You won't get the US price in the UK buying in the UK. A lot of people go to the US and buy items to bring back. Things are on average 30 to 40% less in the US and that's just a fact of life. Value for money is much higher out there.





▲ *Amazon.com will ship internationally, but it's not cheap – and, no, you can't use UK Prime membership*

about 'Rip-off Britain'. Yet there is no denying the truth. A lot of technology is cheaper if you buy it from an American store, and even when you take into account sales tax and export duties, the savings can seriously stack up.

Apple's Watch Sport, for example, can cost UK buyers up to £75 more than if it was bought in the US. This differential is based on the 38mm Sport version costing £299 in Britain and $349 (£224) in America. If you buy the watch in a state that does not have sales tax (such as Montana), the savings are particularly huge, but even in states such as California with 9% sales tax (which takes the price to $380.41 (£244.64)), the saving is still some £54.

Why is this? Well, some companies such as Sony say it costs more to do business in the UK than it does in the US (and Japan). They say the European market is broken up into so many territories and that by pitching a higher price, they're also able to protect themselves against a fall in currencies. Apple has said in the past that its international product prices are suggested on the basis of currency exchange rates, local import laws, business practices, taxes and the cost of doing business. This is an argument put forward by other firms too.

But it could also be claimed that companies will also simply charge what they feel the market would be willing to pay, and there's no doubt that prices would fall if the demand for items declined. Yet as long as people are buying, there is no incentive not to capitalise on the extra money the UK can pull in.

Digital Services

Never is this more stark than when looking at digital items, which often cost more for UK consumers than for those in the US, even though there is an absence of packaging, shipping and any tangible item whatsoever. Subscriptions to the movie and TV streaming service Netflix costs from £5.99 in the UK but from $7.99 in the US, for instance. That's the equivalent of £5.12, and it's made worse for the fact that America gets more content than we do in the UK, and it also gets television shows earlier.

Cost Of Living

There is a huge difference in costs for various items in the UK and US, and it goes way beyond electronics

Item	UK	USA
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Domestic Beer	£3.20	£2.25
Bread	£1	£1.60
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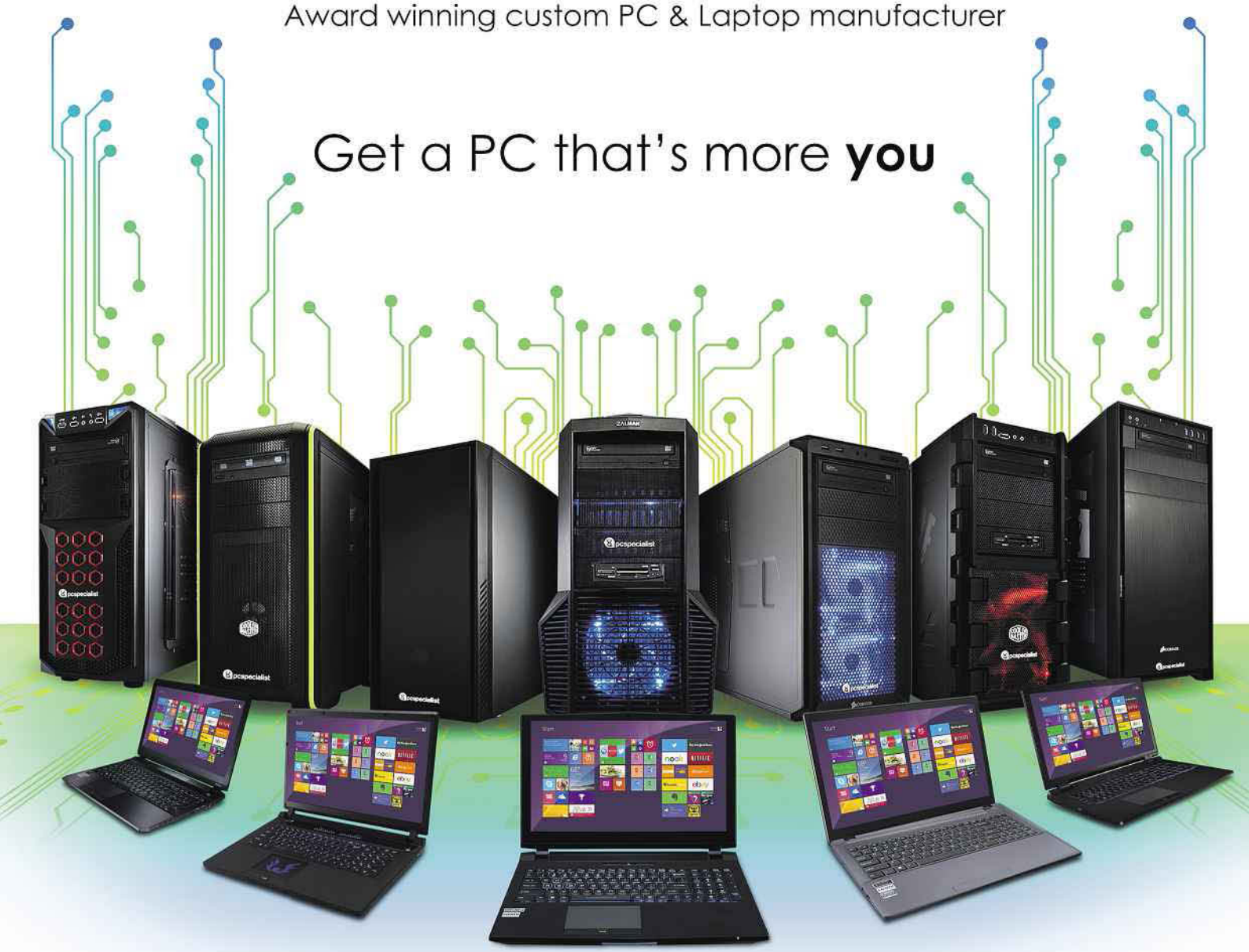
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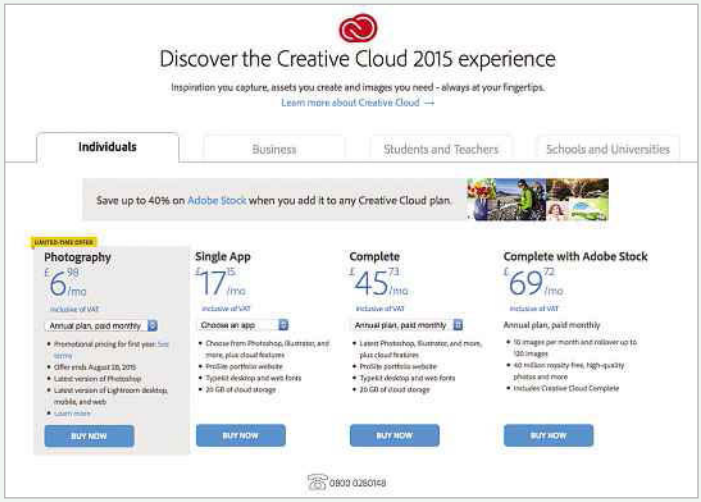
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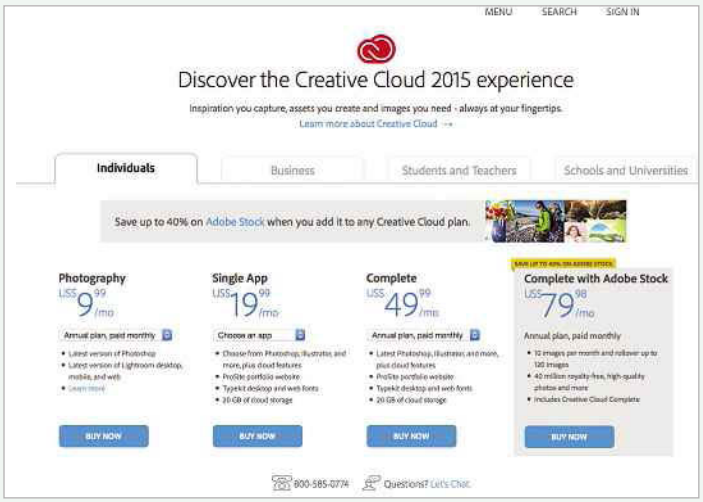
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▲ ***Adobe Creative Cloud pitches its monthly prices at a lower cost for US users***

Spotify is another offender. It costs £9.99 in the UK but $9.99 in the US. This is a typical tactic – simply copying the same price but in different currencies – but it means American listeners enjoy their music at a more tuneful £6.40 each month. It's a strategy that has been copied by Apple Music, Tidal and Deezer, and it has led Marc Gander of the Consumer Action Group to declare, "British consumers are constantly taken for mugs" (more so considering that in Europe, customers pay 9.99, which means the UK is even more expensive than across the continent).

Yet it goes on. Amazon Prime costs £79 in the UK and $99 (£63) in America. Complete Adobe Creative Cloud accounts cost £45.73 each month in the UK and $49.99 in the US – the equivalent of £31. Windows 10 Home can be downloaded for £99 in the UK but for just $119.99 (£77) in America. The price gap is getting narrower, because we get fewer dollars for our money these days, but our pockets are taking some battering, it would seem.

Jetting Off

Before you start checking out American websites and booking flights, though, there are a few things to bear in mind when shopping outside the EU. The first is that not everything is cheaper (an Intel Core i7 4960X Extreme Hex Core CPU costs £735.99 at Amazon.co.uk and $1,147.80 (£737.23) at Amazon.com), but these examples are few and far between.

More important is getting items through customs. When you seek to bring an item back to the UK from outside the European Union, you're viewed as an importer. If you go in person, your items must be declared as you re-enter the UK, and if they're sent by post, then the Royal Mail is legally obliged to inform HM Revenue & Customs, which can not only hold up delivery but leads to a card listing the current charge being popped through your door.

The potential charge can be made up of excise duty, customs duty and import VAT, which is applied to goods over the value of £18 (or over £36 if sent between two private individuals). There will also be a Royal Mail handling fee of £8 if you're being sent items through the post. All of this usually has to be factored in when comparing the price of goods between the two countries and when working out if you're better off buying from home or abroad.

There are also limits, which differ depending on whether or not you're going to America in person or buying online. Currently, the limits are set at £390 for those who fly home with goods from the States and £135 for those who prefer to travel via a click of a mouse. Should you fall foul of the rules, then purchases from America could become very expensive as duty is added, starting at 2.5% for goods up to £630. Stay within the limits, especially if you're jet-setting, and the savings can often pay for the trip itself.

The discrepancy between physical and online purchases has not gone unnoticed. The consumer group Which? has not only called on manufacturers to play fair, but last year it also urged the government to raise the current threshold for import duty on goods bought online to the same threshold as that placed on goods brought back from abroad, so that shoppers can take advantage of cheaper goods on sale in the US.

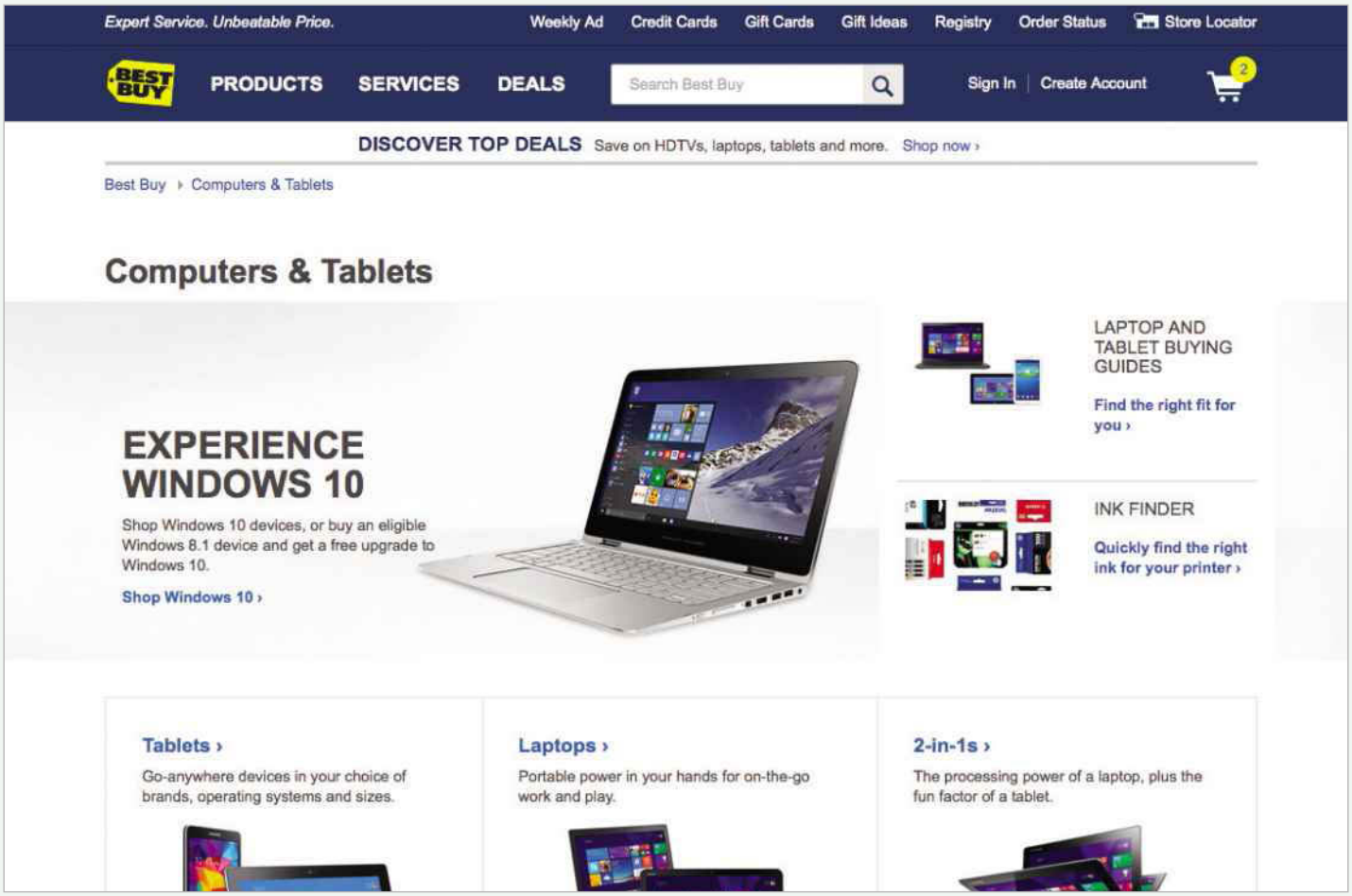
> **"Best Buy will not ship to freight forwarders – or at least to those known to it"**

"UK consumers are getting a raw deal by paying up to hundreds of pounds more for the same tech products on sale in the US," said Which? executive director Richard Lloyd. "Manufacturers should play fair and explain why consumers are paying more for buying in the UK." The current rule affects some electrical goods, which attract an import duty rate of 3.7%. Some items including televisions incur a duty of 14%. But there is some good news.

Duty Free

Certain products do not attract any duty when they are being imported into the EU. This includes most household furniture and books, but it also extends to computer software, desktop PCs, digital cameras, laptops, mobile phones and videogame consoles. This is brilliant for Micro Mart readers intending to slash the cost of purchases, not least because it cuts out any uncertainty over whether or not there's going to be a surprising bill when your item hits these shores.

So what is cheaper and what effect does this have? Well, an Xbox One games console bundled with *Halo: The Master Chief Collection* currently retails on Amazon.co.uk at £349.90,



Best Buy is a great place to buy electronic items. You must go in person

whereas on Amazon.com it will cost you $342.84. That is the equivalent of £220.33 at today's rates, a significant saving. But to import this machine would require Amazon Expedited shipping to the UK costing $6.99 (£4.49) per shipment and an additional $2.99 (£1.90) per lb, which would add up to $38.87 (£24.97). Add VAT at 20% (£44) and a UK power lead at around £2.99, and you'd be looking at paying £296.78. Even then, that would save you £53.12.

Let us do the same with a 27" Apple iMac with a 3.2GHz processor and 1TB of storage. The UK Apple Store quotes a price of £1,449, including VAT of £242. On the US site, you can buy the same machine for $1,799. With the estimated tax of $118.73, the price increases to $1,917.73. Since this is the equivalent of £1,230.73 if you go over to the United States and buy this in person, you'd be saving £218.27. That's not quite enough to cover a return flight to the US, but combine it with some other goodies while you're out there and the savings will inevitably stack up.

What's more, if you go at the right time and shop in the right places, then saving potential increases even further. A good number of department stores in the US will slash prices further, and it's possible to get discounts for being an international visitor (some exclude electrics and electronics, so do your research; Macy's, for instance, has a Visitor Savings Pass that will take off 10% on items and is valid for 30 days but it's no good for tech purchases). Our Apple iMac retails for $1,679.99 at Best Buy, though, so with our sums above you can expect to lop off at least another £70 – an additional sum that could just about buy you a return ticket if you're lucky.

Duty Exemption For Technology

At the end of July, a major deal was announced that looks set to slash the amount it will cost to buy technology products in the future. The World Trade Organisation has updated its IT agreement, which was first put in place 18 years ago, by adding 201 products to the list of items that attract a zero tariff.

The deal is said to be worth £838 billion, and it's intended to inject extra life into the technology sector. Robero Azevedo said the agreement was a "landmark" and added, "Eliminating tariffs on trade of this magnitude will have a huge impact. It will support lower prices – including in many other sectors that use IT products as inputs – it will create jobs and it will help to boost GDP growth around the world."

But what will it mean? The actual details will be finalised in December, but it will mean adding items such as printer cartridges, touchscreens and manufacturing tools for printed circuits. That will, in turn, lead to lower prices for computers and hi-fi systems as well as touchscreen devices. It will also affect the prices of smartphones, routers and cordless infrared remote control devices for videogame consoles.

The deal doesn't see import duties eliminated immediately, but they will be phased out over the coming year until, by 2019, they are removed entirely. The full list of items that will be exempt from tariffs can be seen by visiting: **goo.gl/XjQcJZ**.



Best Buy is a particularly good store to check out, with lots of discounted technology products available. A GoPro HERO4 Session HD Waterproof Action camera is $399.99 (£256.60) and comes with a free $40 gift card. The official GoPro website lists this product at £329.99. A HP Officejet Pro 8620 e-All-in-One Printer can be bought from Amazon.co.uk for £143.40 but at Best Buy for $149.99 (£96). You could slice a couple of hundred pounds off a Micro 1.40TB internal solid-state drive (Best Buy $3,704.99 (£2,375); Nigelohara.com £2,563.35). And you could buy an Acer 21.5" LCD HD monitor for $129.99 (£83.35) from Best Buy or for £111.22 in the UK and save £28.87) since monitors, unlike TVs, are exempt from duty.

Buying from Best Buy if you don't intend to visit in person is difficult, though. The company will ship to the 50 US states, the US Virgin Islands, Guam and APO/FPO military addresses, but it will not ship anywhere else outside the US, so you either have to get a friend in America to forward it on or you just have to get flights across the Atlantic. Best Buy will not ship to freight forwarders (or at least to those known to it, so hunt around for obscure ones if you want to go down this route), and it says it assumes that products will be used in the US. Should it suspect otherwise or know that the address is being used by a forwarding company, then the order will be cancelled.

Disaster Strikes

Obviously one of the perils of buying from America is what happens if something goes wrong with the item. It will not be as easy to return it. You need to carefully look at the terms and conditions of a sale and what happens with international orders. If you manage to buy an item from a company such as Best Buy and get it forwarded on, are you entering murky waters?

If you have a problem with an item you've bought from America and you have a complaint about how a company is dealing with you, then you can try the Better Business Bureau, which helps to resolve disputes, You can also try the Federal Trade Commission. This, according to the UK Citizens Advice service, will take action against the trader, but it will not seek to resolve your individual complaint.

There are ways to protect yourself, though. By making a purchase on a credit card for an item valued at between £100 and £30,000, you will be protected, and that extends to anything you buy online, by phone or mail order. This protection is laid down in the Consumer Credit Act 1974, most notably in Section 75, which removes the risk of being put into debt for goods and services that fall below expectation. It makes the credit card company jointly liable.

"A good number of department stores in the US will slash prices further"

But what about warranties and guarantees? Generally, if the item you buy is from a global manufacturer, you should be covered by its warranty. You won't be covered by European Union regulations, though. When you buy an item from abroad, do some research and perhaps even tweet to the company that makes the product you're purchasing to check its policy. You'll want to know whether or not the warranty being offered is worth the paper it's written on for your circumstances. If you don't mind that there could be an element of risk, it's still worth bearing in mind that most products should arrive without any associated problems.

With all that in mind, it might be worth considering where you next book your trip. If you have a lot of technology items to buy, then a trip to the US is likely to be well worth your time. Book at the right time (during the sales and around Christmas), and you may well benefit from the cost-cutting that will be going on. Just remember to have a spare suitcase to hand. If you're anything like us, you may well need it. **mm**

Some Price Comparisons

Item	UK	USA
Apple's Watch Sport	£299	$380.41 (£244.64)
Netflix	£5.99	$7.99 (£5.12)
Spotify	£9.99	$9.99 (£6.40)
Amazon Prime	£79	$99 (£63)
Adobe Creative Cloud	£45.73/m	$49.99/m (£31)
Windows 10 Home	£99	$119.99 (£77)
27" Apple iMac	£1,449	$1,917.73 (£1,230.73)
GoPro HERO4 Session	£329.99	$399.99 (£256.60)
HP Officejet printer	£143.40	$149.99 (£96)
iPad Air 2	£399	$531.93 (£340)
Kindle Paperwhite	£98.99	$119 (£76)
Amazon Fire Stick	£35	$39 (£25)

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- Fast 8GB DDR4 2400MHz Memory
- 1TB Hard Drive
- 120GB Patriot Blaze SSD
- IN Win 703 Mid Tower Gaming Case
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FREE GAME
- **METAL GEAR SOLID V The Phantom Pain**

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- New Intel® Core™ i7 6700K Processor
- MSI Z170A PC MATE Motherboard
- 4GB NVIDIA GTX 970 graphics card
- Fast 16GB DDR4 2400MHz Memory
- 2TB Hard Drive
- 240GB Patriot Blaze SSD
- ZALMAN Z11 Neo Luxury Gaming Case
- New Microsoft Windows® 10
- Lifetime Gold Warranty*



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- 8GB DDR3 1600MHz Memory
- 1TB 7200rpm Hard Drive
- Wireless 10/100/1000 Gigabit Ethernet
- 5-6 Hours Battery Life
- New Microsoft Windows® 10
- Integrated HD Webcam, Sound Card, Microphone and SD Card Reader
- 2 Year Gigabyte Warranty

17.3" Mesh V4-HO | £1399
Inc. VAT & Delivery





FREE GAME
- **METAL GEAR SOLID V The Phantom Pain**

- Intel® Core™ i7-5700HQ Processor
- 17.3" LCD Full HD (1920x1080)
- 6GB NVIDIA GeForce GTX 970M
- 16GB DDR3 1600MHz Memory
- 2TB 5400rpm Hard Drive
- 256GB SATA SSD
- Blu Ray Read/Write Optical Drive
- New Microsoft Windows® 10
- Integrated HD Webcam, Sound Card, Microphone and SD Card Reader
- 3-4 Hours Battery Life
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Free Alternatives To Commercial Software

If you're on a limited budget or just like free and open-source software, Roland Waddilove has some alternatives to popular commercial software that might be right up your street

Commercial software like Microsoft Office, Adobe Photoshop and other applications sell in huge volumes because they're excellent. They're also expensive, especially when you look at the long-term costs of using them. Both those examples require monthly or annual subscriptions, and as the years go by the cost mounts up – to more than £1,000 over five years, in fact. Are there any alternatives?

Yes, there are, and some of them are very good indeed. Although none of the substitute applications covered here are quite as polished as the commercial ones, often they're good enough. If you're running a business and can afford the commercial software prices, then go for it, but for the rest of us with our hobbies, interests, work from home, sole traders and small offices, we need cheaper and preferably free alternatives, and there are plenty.

None of the programs here will cost a penny, and some of them are quite capable and make good alternatives to the main programs listed. If you want to save thousands on software purchases, start downloading these freebies.

Commercial Program: Microsoft Office

Microsoft Office has such a dominant position in businesses that it is rare to see anything else. Its market share has perhaps been eroded

slightly in recent years, because there are some good alternatives, but not by much, and Office remains Microsoft's cash cow. It brings in huge amounts of revenue for the company and is one of its largest sources of income.

One of the reasons why Office is so popular is because the applications are so powerful. There are few programs that can do what Word, Excel, PowerPoint, OneNote and Outlook do. Free applications might provide similar features, but they're not quite the same. Compatibility is the key issue preventing the widespread adoption of rival software in businesses. It's quite easy to create Word documents, Excel spreadsheets and PowerPoint presentations that do not load correctly into rivals.

Switch to an alternative office suite, and the spreadsheet you created last month with Excel fails to work, the Word document you created is formatted incorrectly, the slideshow doesn't run and so on. It could take a lot of time and effort to fix. This makes it hard for rivals to get a foot in the door, and it's easier to keep paying Microsoft the licence fee and continuing to use Office.

If you're a home user, then, compatibility is less of an issue, although it could crop up with students who create documents for school or college. Home users generally don't swap documents, spreadsheets and presentations with other people, unless they're working from home, and that's just an extension of the office.

> **One of the reasons why Office is so popular is because the applications are so powerful**

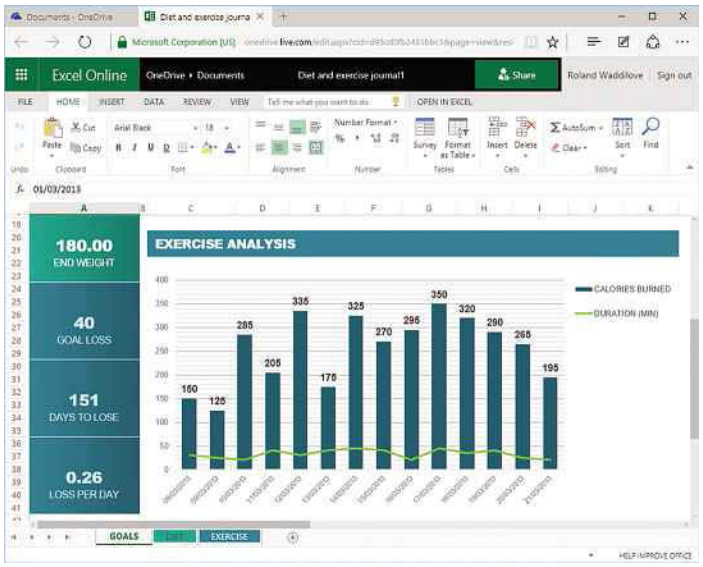
Microsoft Office 365 Personal costs £59.99 a year and provides a single licence for Word, Excel, PowerPoint, OneNote, Outlook, Publisher and Access to be installed on one computer. Office 365 Home costs £79.99 a year and can be installed on five computers, including Apple Macs. Your 15GB of OneDrive online storage is bumped up to a healthy 1TB. You really have to think about the long-term costs, though, and over five years the cost is nearly £300 for Personal and £400 for Home. That's a lot of money, and who wouldn't like to save £400 with a free or open-source alternative?

Free/Open Source Alternatives

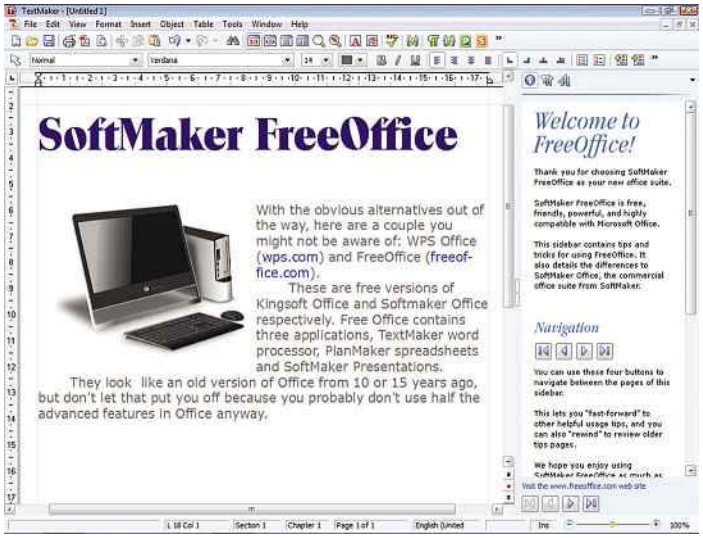
There are some very good alternatives to Office, provided you do not need to exchange complex documents with Office users. Simple word processor documents, spreadsheets and presentations are fine, and alternatives provide Word, Excel and PowerPoint import and export facilities, but not all features are 100% compatible.

One of the best free alternatives to Office is the web version of Office. Go to **onedrive.com** and you can run the web-based versions of Word, Excel, PowerPoint and OneNote. All you need is a free Microsoft account (such as Outlook.com). They run within a web browser window, and although they have fewer features than the Office 365 versions, they're surprisingly good. They even look like the real thing and have similar ribbons, menus and buttons.

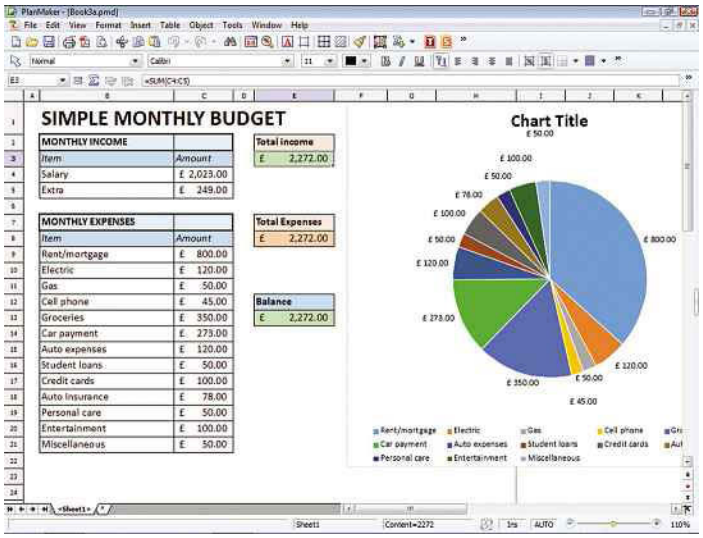
Office web apps are fine for home users and light business use and, what's more, they preserve features that were added in the desktop version, so you can view and edit files sent to you by Office users and share them. OneDrive is built into Windows 8 and 10, and is available as a download for Windows 7, which means



Office web apps are free and are fine for simple word processing and spreadsheet tasks



TextMaker is the word processor from FreeOffice, and it's fine for simple documents



This spreadsheet started out in Exce but has been loaded into FreeOffice PlanMaker

that files you create in the web Office apps appear on your PC's disk drive as well as being online.

Google provides an alternative to Office in the form of Drive. Log into **drive.google.com**, and you have access to the Docs word processor, Sheets spreadsheet, Slides presentations and a few more tools. This article is, in fact, being written in Google Docs, which is a perfectly capable word processor. It doesn't load Word, Excel or PowerPoint files but instead converts them to its own format. How well it does this depends on how complex they are, but simple ones are generally fine.

Google Docs, for example, supports spell checking, images, links, tables, equations, drawings, comments, table of contents, word definitions, thesaurus and all the text formatting you would expect of a word processor. Documents from all the Google apps can be exported in Office file formats if you need to exchange them with others who might be using Office or alternatives. Office file formats have become the exchange medium that can be used to get files into and out of Office suites.

LibreOffice (**libreoffice.org**) is one of the best known alternatives to Office, and it's very similar to Office before it gained the ribbon toolbar. It doesn't have Office's modern interface, but it certainly packs in the features. In fact, in some ways it's better than Office. It isn't 100% compatible when exchanging complex files, but simple ones are fine.

In LibreOffice you get Writer documents, Calc spreadsheets, Impress presentations, Draw drawings, Math formula and Base database. A bonus that might be useful for some people is the portable version (**portableapps.com**), which enables it to be carried on a USB drive and run on any PC without installation. You can carry your office software and files in your pocket. OpenOffice (**openoffice.org**) is almost identical, but many people prefer LibreOffice.

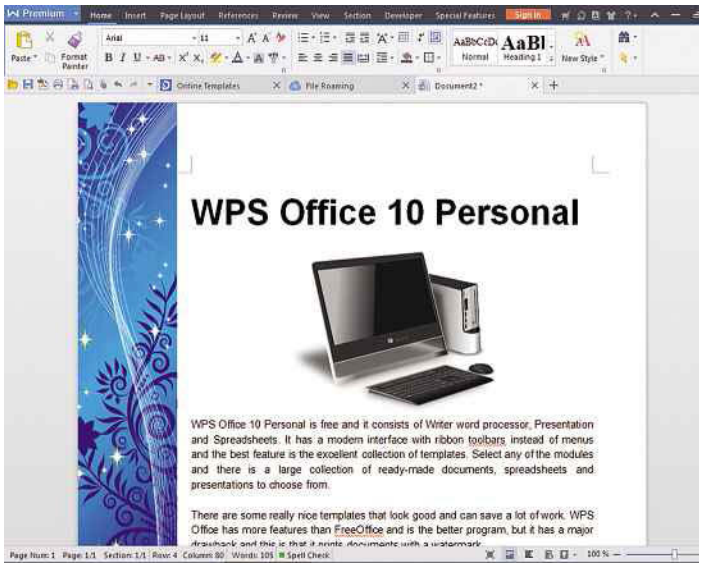
With the obvious alternatives out of the way, here are a couple you might not be aware of: WPS Office (**wps.com**) and FreeOffice (**freeoffice.com**). These are free versions of Kingsoft Office and Softmaker Office respectively. Free Office contains three applications: TextMaker word processor, PlanMaker spreadsheets and SoftMaker Presentations. They look like an old version of Office from ten or 15 years ago, but don't let that put you off, because you probably don't use half the advanced features in the latest Office anyway.

WPS Office 10 Personal is free, and it consists of Writer word processor, Presentations and Spreadsheets. It has a modern interface with ribbon toolbars instead of menus, and the best feature is the excellent collection of templates. Select any of the modules and there's a large collection of ready-made documents, spreadsheets and presentations to choose from. There are some really nice templates that look good and can save a lot of work. WPS Office has more features than FreeOffice and is the better program, but it has a major drawback, which is that it prints documents with a watermark. You can upgrade to the Business edition for £51, though.

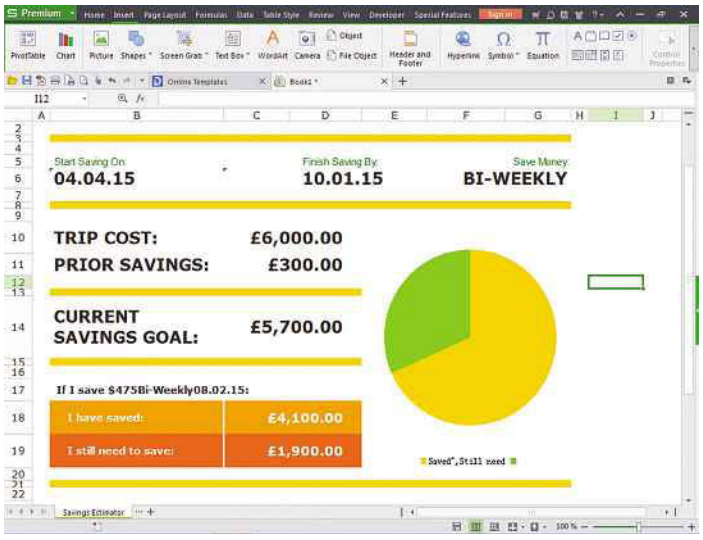
Commercial Program: Adobe Premiere Pro

There are many budget video editing applications under £100, and several are under £50, such as Corel VideoStudio Pro X8, which is a great package that is packed with features, yet only costs £43.99. When talking about video editing software, however, Adobe Premiere Pro is the tool that everyone compares to, and it has been a market-leading package for many years.

The difference between budget and pro tools is the ease with which tasks can be performed. For example, if you need a video to be exactly five minutes, 34 seconds long, you click a few buttons,



The word processor in WPS Office can be used instead of Microsoft Word



The spreadsheet module in WPS Office is fine for creating worksheets and charts



LibreOffice is one of the most powerful alternatives to Microsoft Office



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Free PC is the latest generation of mini-computer. Although it's only the size of a USB flash drive, the FreePC still has all the power and performance of a normal sized PC. The MODECOM FreePC is equipped with a powerful quad-core processor power Intel® Atom Bay Trail-CR Z3735F with 2GB of RAM and integrated Intel HD graphics. MODECOM FreePC runs off Microsoft Windows

MODECOM FreePC is an incredibly small device that makes it possible to turn your PC or monitor into a big screen Personal Computer. The combination of new generation components with stylish design and compact size creates an office tool that fits in every pocket. Simply plug FreePC into an available HDMI connector on your TV/monitor, connect it to a power source via USB, and in seconds you will be have access to the rich world of multimedia entertainment. With an Internal flash disc capacity of 16GB there is plenty of space for your favourite multimedia files (movies, photos, music), however the internal storage can easily be increased by using the built-in micro SD card reader with support up to 32GB micro SDHC

MODECOM FreePC is also an excellent device for business solutions. Featuring Bluetooth 4.0 the device is portable and can easily be connected to peripheral devices such as mice and keyboards.



Energy-saving and environment-friendly technology

In MODECOM FreePC we put very efficient components making it a mini-size personal computer, while having a low demand for electricity.



High-capacity 16 GB Flash disk for your favorite multimedia files

Internal flash disc with capacity of 16GB, let you store large amounts of your favorite multimedia files (movies, photos, music).



Micro SD/SDHC card reader supporting up to 32GB

Internal storage can be enlarged easily by using built-in microSD card reader with support up to 32GB micro SDHC. This means a maximum total of 40 GB.



Two USB 2.0 port (one USB mini, second USB micro)

Thanks to this feature, FreePC can works with an external 3G modems. It means that thanks to this device and 3G modem, you can browse the Internet always where you in range of your mobile operator network. You can also easily connect external hard disk, pendrive or other accessories like mouse or keyboard.



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and Premiere Pro does it automatically by adding or removing frames at scene changes. A Morph Cut feature makes talking head interviews smoother by using face tracking and frame interpolation to create seamless transitions. Premiere can edit videos up to 4K resolution and supports many native camera formats. You get 20GB of online cloud storage and you can edit projects in the mobile versions of Premiere too.

There's no doubt that Premiere Pro is a powerful video editor with a lot of great features, but it's also expensive, and Adobe has placed it beyond the reach of the casual user who wants to edit the video footage of their holiday, wedding, birthday and so on, shot on their mobile phone. It's even beyond the budget of serious video enthusiasts and hobbyists. It's part of Adobe Creative Cloud, so you don't buy it; you subscribe, at £205 a year. Over the next five years, you'll pay over £1,000 for the use of Premiere Pro.

Free/Open Source Alternatives

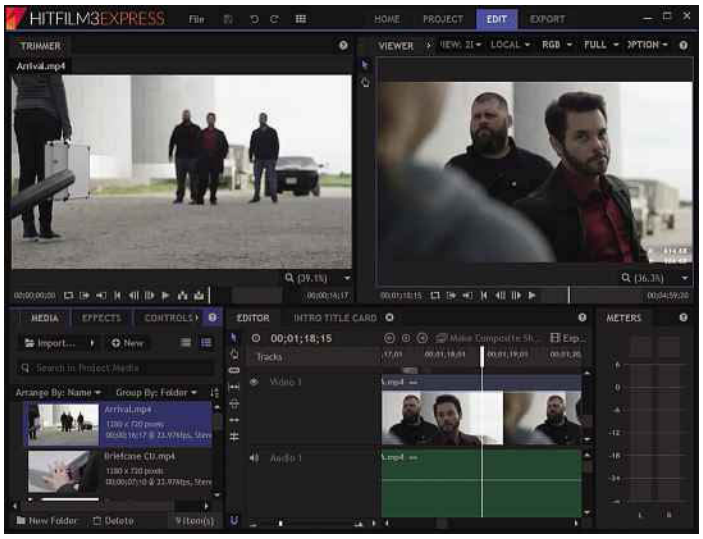
There are several free alternatives to Premiere, some of which we've looked at before. For example, there's MoviePlus Starter Edition (**serif.com/free-video-editing-software**) and VideoPad (**nchsoftware.com**), both of which are suprisingly good for free programs, but they really aren't in the same league as Premiere. They're great for editing your home movies like holidays, parties and family occasions, but you wouldn't use one to produce a high-quality video that could be used for commercial purposes like a music video, adverts, documentaries and other projects that might be seen by the public.

> **“There's no doubt that Premiere Pro is a powerful video editor with a lot of great features, but it's also expensive”**

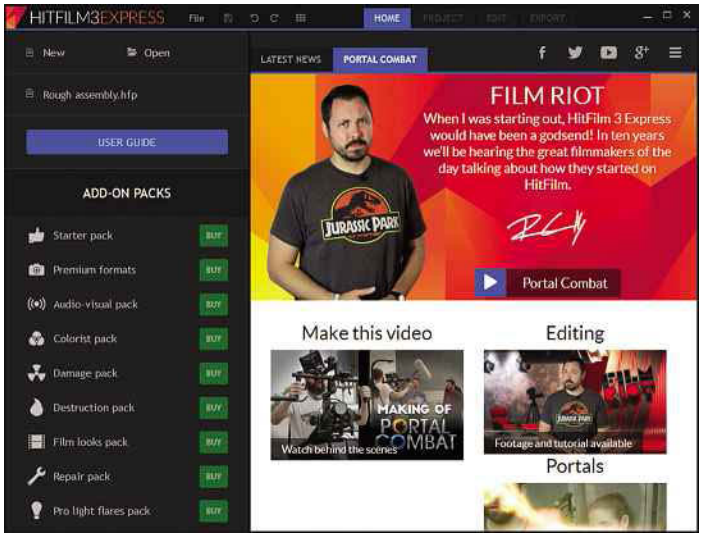
Lightworks (**lwks.com**) is a professional-level video editor that can and has been used for commercial projects and even some Hollywood movies. No doubt editors out in LA add a few extras to the free software when they're producing their blockbusters, but the basic software is free. It has a steep learning curve, but it's very good at manipulating video and audio, which makes cutting between scenes and camera angles much better than with many other free tools.

If you want to create movies with special effects, then HitFilm 3 (**hitfilm.com**) is pretty amazing. It comes in two versions: Free and Pro. They're basically the same, except the free version is sort of pay-as-you-go. You get the video editor and 157 effects and presets for free. If you need more, then there are 14 premium effects packs ranging in price from £7.79 to £78.01 each. You don't need to buy these effects packs, and you can edit videos for nothing, but the idea is that you add the effects you need. For example, there's a Destruction pack with muzzle flashes, blood spray, fire and lightning, a Sci-Fi Adventure pack with lightsabers, 3D laser blasts and others.

The software is designed for video editing professionals and serious hobbyists who need professional-level effects and editing. It's ideal for music videos, short films, commercials, sci-fi movies and so on. You can easily load a group of clips, add them to a timeline, trim the in and out points and so on. The way that you can add special effects to movies is pretty amazing, and you can simply drag and drop effects like smoke, gunfire, explosions and so on from a library of effects. You can drag them around in 3D to line them up with the actors, objects and scenery, and they can automatically track the position of moving objects.



HitFilm Express is packed with special effects for your action and sci-fi movies



Although HitFilm 3 Express is free, it does have a lot of optional in-app purchases

HitFilm 3 Express goes way beyond what most people need out of a video editor, but it's perfect for anyone who wants a pro tool or needs to add Hollywood-style movie effects to their productions. It has a steep learning curve, but there are a lot of tutorials on the website.

Commercial Program: Photoshop

Happy birthday, Photoshop. The Adobe app that seems to have been around forever is now a quarter of a century old, with the original being released way back in 1990. That's mind boggling, and few programs have lasted so long, which is a testament to its superiority over rivals. Not only is it a product name, it's also become part of our language, as in 'to Photoshop an image', whether or not Photoshop was actually used (it probably was).

The software is part of Adobe Creative Cloud, which requires a subscription costing £205. It sounds reasonable at first, until


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you work out the five-year cost means you'll end up paying over £1,000. It's great if you can afford it, but in a minute we'll look at some alternatives that will not cost anything. Why do people pay so much for a photo editor? It's simply the most powerful software around, and its tools are the best. Many cheaper photo editors mimic Photoshop features and functions, but they rarely do it as well. Jobs that require creative design skills often specify familiarity with Photoshop as a requirement.

Photoshop is aimed at professionals creating artwork for commercial projects, and it does more than you might expect. For example, you can create artwork for phone and tablet apps or website designs. It has a brilliant feature that enables you to wirelessly link a phone or tablet to your PC, and as you work on artwork on your PC, the phone and tablet on the desk next to you update automatically to show live previews.

Multiple layouts of documents can be created using Artboards and viewed in a single document. There's a content-aware fill for better stitching of panoramas, support for HiDPI (high-resolution monitors), support for 3D printing and 3D file formats, intelligent upsampling to make images billboard sized and a zillion other features. It's no wonder professional designers, artists and photographers use it.

Free/Open Source Alternatives

GIMP (**gimp.org**) is the obvious alternative to Photoshop, and it's been covered many times before. It's almost as old as Adobe's photo editor, having been around since 1995. It hasn't been updated much recently (it's been on version 2.8 since last summer), but it's not lacking in features. It doesn't output CMYK images, which are commonly using in professional printing, but for basic photo editing tasks, it's adequate for most people's needs.

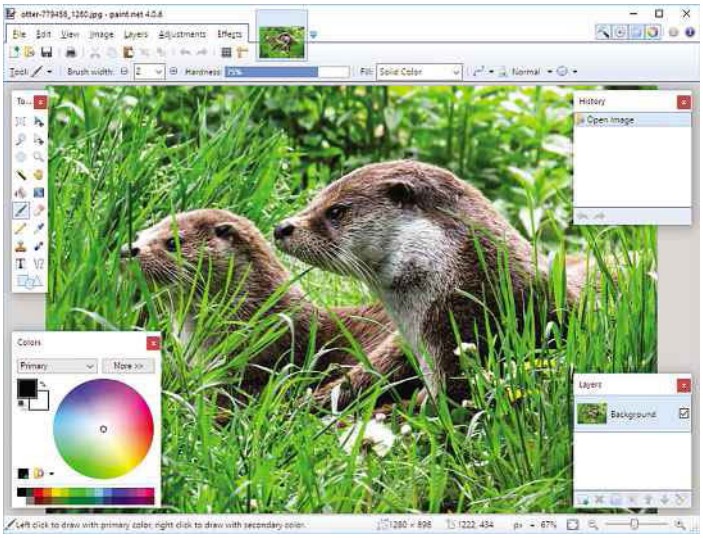
The interface takes time to get used to, and in addition to the single window mode, which is used by most software, there's a floating windows mode. There are numerous dockable panels like colours, brushes, patterns, gradients, a toolbox and tool options and many more. The images in this article have been through GIMP at some point on their way to being published, and many people use it to edit photos, create graphics for websites and other projects.

Sumo Paint (**sumopaint.com**) is a free photo editor that has some useful features. It's an online tool that runs in a web browser, but it has a good range of tools and functions. It's not as powerful as GIMP, and it's not suitable for professional photo editing, but it's okay for enhancing your own snapshots and fixing flaws. Even though it runs in a web browser, it's fast and usable, and it's light years away from Windows Paint, although far short of Photoshop. It features a good toolbox, multiple layers, colour balance and temperature, hue and saturation, 12 categories of filter with up to seven tools in each, load and save to the disk, and quite a bit more. It's not a pro tool, but it's fun for everyone else.

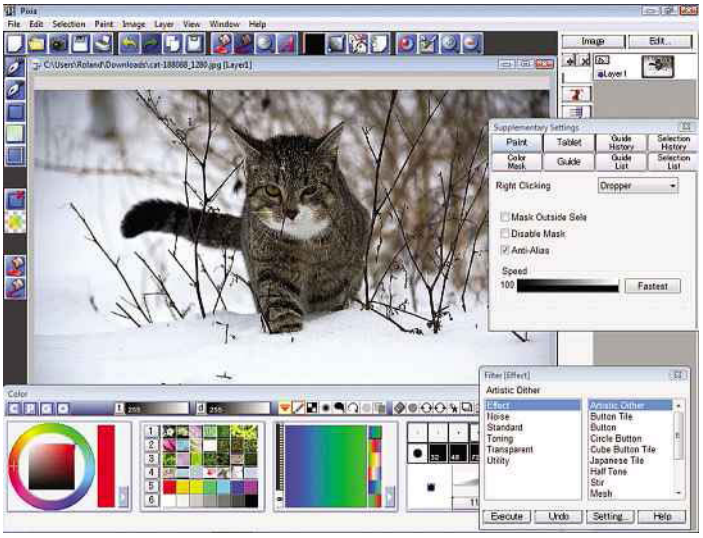
Paint.NET (**getpaint.net**) is another well-known free photo editor that offers a good selection of image editing features and tools. It started out as an undergraduate project at Washington State University over ten years ago and has just been updated with Windows 10 compatibility, some new features and bug fixes. It's close behind GIMP in terms of features, but the interface is more traditional and easier to use, so some people prefer it.

There are the usual tools like different selection options, including a magic wand, fills and gradients, paintbrush and pencil, shapes, text and so on. It supports multiple layers, hue, saturation, levels charts and curves, and over 30 effects in categories like artistic, stylise, distort and others.

One final photo editor worth looking at is Pixia (**bit.ly/1P0kXmC**). Once again, it's far behind Photoshop, and it's not a



Paint.Net has a simple set of tools, but it works well as a basic photo editor



Pixia has some interesting tools and features for enhancing photos and artwork



Sumo Paint is a simpler and free alternative to Photoshop and runs in a browser

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Scribus is harder work than word processor but offers better layout and design

professional tool, but it is good for most of the photo editing tasks you'll want to perform on your home computer. There's a good range of features and the usual dodge, burn clone and other tools, colour adjustment, brightness, contrast and so on.

Commercial Program: Microsoft Publisher

When it comes to publishing magazines for print or digital formats, there are some great professional tools like QuarkXPress (**quark.com/Products/QuarkXPress**) and Adobe InDesign (**adobe.com**), but they're expensive. Really expensive. QuarkXPress is £799 and InDesign is £205 a year. Many businesses buy into the whole Adobe catalogue of software, which works out cheaper than individual packages, and that costs £548 a year. However, that's more than many home and small business users spend on their PC.

Every magazine you read has been produced in one desktop publishing program or another, and usually one of the top-end packages. If you take out a Microsoft Office 365 Personal subscription costing £59.99 a year, then in addition to Word, Excel and PowerPoint, you also get Publisher too, Microsoft's DTP program. Given the reasonable price of Office 365 Personal, you might have come across this application.

This is a very useful program for home users and small businesses that want to produce newsletters, flyers, signs, cards and brochures. It comes with templates to get you started, and you can create a wide range of publications from scratch. Text, images and shapes can be mixed on the page and text flowed from one frame to another; effects can be applied like soft shadows; and objects on the page lined up and so on.

Free/Open Source Alternatives

Scribus (**scribus.net**) isn't quite so straightforward or intuitive as Microsoft Publisher, but it's not far behind in terms of features. If you haven't tried a DTP program, it's like a word processor in many ways, but it has more powerful positioning and layout facilities. You can insert text frames and link them to flow a story across columns, insert image frames, render frames (formulas, music notation and so on) and various shapes. Objects can be layered, there's hyphenation, page numbering, master pages that can be used throughout a publication and more. Publications can be output as an EPS, PDF, image or an SVG file.

A lot can be achieved with a word processor these days, and LibreOffice could be used for simpler publications, but Scribus has better layout and design features. Write the text in LibreOffice, prepare the images in GIMP and put everything together in Scribus.

Commercial program: CorelDRAW Graphics Suite X7

CorelDRAW (**corel.co.uk**) is a vector graphics program that is loved by artists and designers. It has been a market leader for over a quarter of a century and dates back to 1989. It has always been expensive and beyond the budget of most home users and even some small businesses. The Small Business Edition costs £849, the standard edition is £479, but there's a Home and Student edition that costs just £89.95.

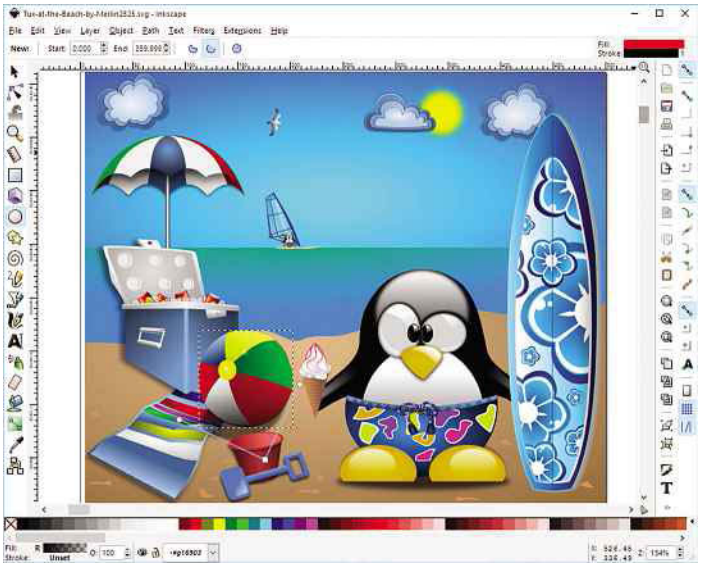
The software is mainly for illustrations, but it also borders on desktop publishing, and it could be used for single-page publications like flyers, adverts, posters and so on. A DTP program is better for longer publications. Its main purpose is for creating images, and the artwork that can be produced with it is amazing, but of course, you need the artistic skills to use it. It has precision tools for layout and drawing, vector and bitmap pattern fills, brushstrokes with transparency and feathering, creative vector shaping tools and even page layout and web graphics tools.

Free/Open Source Alternatives

Inkscape (**inkscape.org**) isn't as powerful as CorelDRAW, which is in a different league, but the software is still very good, and it's capable of producing great artwork in the right hands. Left and right edges have all the drawing tools you need to create vector artwork. You can draw lines and shapes, 3D boxes, spirals, stars and polygons. And you can draw freehand or use Bezier curves, draw calligraphic or brush strokes, spray or fill objects, create groups of objects, layer them and more.

Inkscape's best feature is probably its extensive collection of filters. They're organised into 18 categories, such as bevels, blurs, bumps, materials, protrusions, shadows and glows and many more. Some of these categories have more than 20 items, so there must be hundreds altogether. There's a similarly extensive collection of extensions.

As with all vector drawing programs, you need to spend a few hours learning to use it and getting to know the features and tools, but it's worth the effort. Whether you'll like it depends on what you're used to. People who use professional tools will find it limited, but for a free program, it's quite good. **mm**



You can find lots of examples of Inkscape artwork at openclipart.org/tags/inkscape

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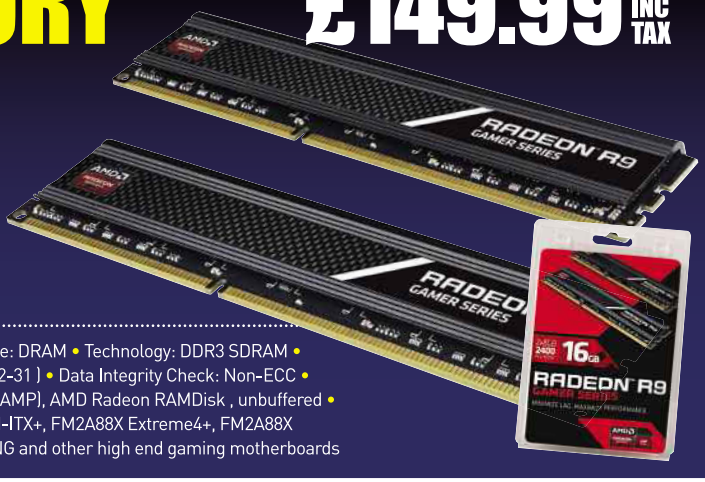
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Remembering... Windows 1.0

It's back to the start of Microsoft's (in)famous GUI this week

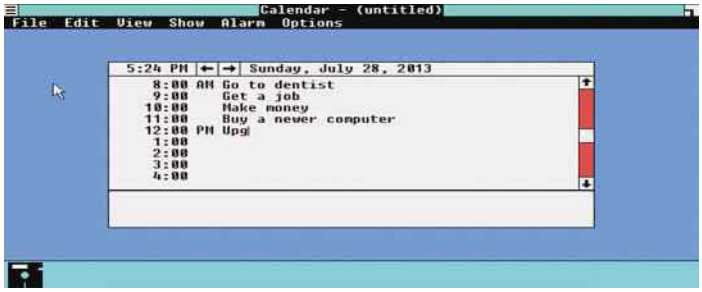
Since we're now celebrating the launch of Windows 10, we thought it apt to take a very long look back to the start of this oft-unloved operating system. Windows has taken a fair bit of grief over recent years, not least in these pages; Vista became quickly became the focus of considerable ire, though that died down a little when more savvy people realised that it wasn't such a bad OS once they applied a few fixes.

The most recent target was, of course, Windows 8, which had a lot of users storming the Microsoft gates (no pun intended) armed with flaming torches and pitchforks. Again, though, with a bit of patience, Windows 8/8.1 turned out okay.

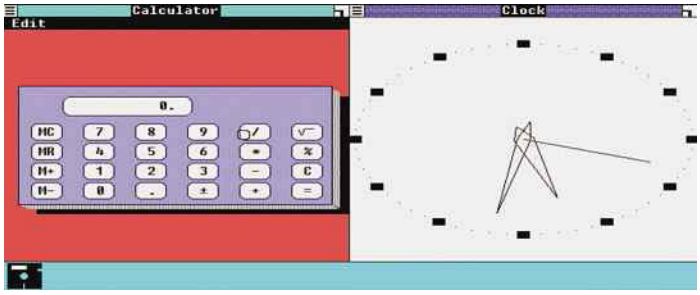
It's the OS everyone loves to hate, though, a scapegoat for whatever's going wrong with a computer. It's not that often that a modern Windows version breaks, though; it happens, but on the whole though, for the average home user, it's a pretty stable basis for a system, and one that can do pretty much everything the user asks of it without the need to learn how to program, drop into a command line, grow a beard or wait until a broken driver is fixed.



Windows 1.0, or 1.01 in this screen shot. Still, pretty near the beginning of it all



The Calendar program, surprisingly good actually



A calculator and a clock, running side by side! Awesome stuff, this

Did You Know?

- The original Windows codename was Interface Manager
- You could run DOS executables from within Windows 1.0, but no more than two at a time
- Windows 1.0 used something called Tiles to display windowed contents. Tiles! They'll never catch on...
- Official Microsoft technical support for Windows 1.0 was charged at $200 per site visit, per hour. Not a bad rate for a mere re-install

Our recent upgrade to Windows 10 had a couple of moments: a USB sound bar stopped working (which just needs to be unplugged/plugged back in) and our Google Drive sync stopped – though we think that this is due to our decision to upgrade as opposed to undertaking a clean install.

History

Windows 1.0 was released nearly thirty years ago, on November 20th 1985, apparently over two years later than originally announced. Unbelievably, the OS went on sale for a mere $99, as a young and (unsurpirisingly) enthusiastic Steve Ballmer was pleased to tell us in a televised sales pitch from the time (**goo.gl/69oAbV**).

Of course this was the relatively early days of a billionaire-making company, but Windows was an astute product. A decent looking GUI that sat on top of DOS, required only 256KB of memory, and came on a pair of floppies was what most users wanted. However, it pays to remember just how niche the market was at the time, when there were only around six million computers sold worldwide.

Windows 1.0 wasn't much liked by the critics of the time, though. In some eyes there was far too much emphasis on using a mouse (a peripheral that wasn't as widespread as it is now), and it didn't perform too well on lesser hardware. There were also issues with drivers for keyboards, screens and printers, however, none of this seemed to do any harm to the GUI or the company.

Within a year, Windows 1.02 was released internationally and featured many improvements including performance enhancements and better drivers. Version 1.03 followed a mere three months later and increased the user base even further with numerous language additions. Version 1.04 though, released in 1987, was much a better product with many enhancements. The rest, as they say, is history.

The Good

A GUI that doesn't cost an arm and a leg. A clock! And Reversi!

The Bad

Initially, poor performance and lack of drivers for many devices.

Conclusion

It's funny looking back, but Windows 1.0 was actually quite good.



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Component Watch

Component Watch

If you're looking for a quality mic, there are more options than ever

The improvements in modern editing software and hosting sites means that starting a podcast has never been easier – and if that's something that sounds like fun to you, the only think you need to make yourself stand out is a half-decent microphone. Getting hold of a half-decent microphone isn't exactly a challenge either, so in this week's Component Watch, we're going to help you do just that with our pic of the best-priced mics around.

Deal 1: Trust Starzz Microphone
RRP: £15 / Deal Price: £8



This low-price desk mic comes with an extra-long 250cm cable and a mini-tripod for desk mounting – though the latter allows a lot of noise to transfer, meaning the Starzz works best as a handheld mic). You can't really argue with a price that low, however, and a 3.5mm jack and on-off switch makes it convenient for recording, and compatible with a huge range of devices. It's an ideal entry-level piece of hardware – although if you've already got a half-decent mic on your phone/tablet/laptop, it's not much better than that!
Where to get it: Dabs (**bit.ly/1HHFGWc**)

Deal 2: Foxnovo SF-920
RRP: £15 / Deal Price: £13



Reflecting its (presumably) portmanteau name – which, we suspect, is designed to evoke certain other tech companies – Foxnovo is a growing brand of budget electronics, and the SF-920 fits that price profile. However, its makers describe it as a professionally-balanced condenser mic with noise-reduction features – one that also has a built-in hardware on/off switch, a 2m lead and a 3.5mm jack. It's shaped for desktop use (and has a desk tripod included) making it ideal for podcasting and voice chat, especially because it'll eliminate the background hum of your fans automatically! A huge step up over the Starzz microphone, for not much more money at all.
Where to get it: Amazon (**amzn.to/1f8T8LZ**)

Deal 3: Snowball iCE HD Audio USB Microphone
RRP: £70 / Deal Price: £50



This high-quality desk mic allows you to record audio on any USB-compatible system, whether for chat or more professional reasons. It's sensitive enough for even quiet voices, but has a large enough dynamic range to capture bands and instruments too. There are no drivers to install and it comes with an adjustable desktop stand and the USB cables you need to get started. Worth the money, especially at a discount!
Where to get it: Maplin (**bit.ly/1DTeiXi**)

Deal 4: Zoom iQ5
RRP: £100 / Deal Price: £65



If you prefer to do your recording on a smartphone, the Zoom iQ5 might be a better option for you than the device's internal mic. This high-quality stereo condenser mic is ideal for recording music but also small enough to fit into your pocket. Its orientation works both vertically and horizontally and you can use the associated app to adjust the stereo performance in real time. A fantastic accessory for any compatible smartphone, and you can pick up the iPhone version for more than a third off!
Where to get it: Gear4Music (**bit.ly/1Eo30Nn**)

Deal 5: Editors Keys SL150
RRP: £115 / Deal Price: £75



If you want to record high-quality vocals, instruments and, yes, podcasts, this is probably the microphone for you. It has Dual 34mm shock-mounted diaphragms to help eliminate all unwanted noise, a fully digital connection to combat interference but it doesn't require drivers for PC connection, as it is fully compatible with all USB-enabled systems. It also comes with a five-year warranty; so, if anything goes wrong, you can always get a replacement. While it's expensive, it's also probably the last microphone you'll ever need.
Where to get it: Juno Records (**bit.ly/1DOdYMp**)

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Kingston Digital Releases New 512GB Card

Class 10 range gains higher capacity

Home Monitoring From iON

New camera works with mobile devices

If you're in the market for an affordable wireless security camera system for your home or business, then iON Cameras may well have you covered. It's just relased The Home, an easy-to-use wi-fi camera option designed to allow monitoring of everything and anything via a user-friendly app on a smartphone or tablet,

The Home provides 24/7 live streaming, a two-way talk function and remote viewing. You can store, archive or download any clip via its cloud-based system, with 24 hours of free cloud storage as standard. The associated app makes watching, deleting, sharing, storing or downloading videos simple, with settings allowing the user to create and control alerts for motion, noise and tampering. Footage is then sent directly to a mobile device or browser.

With a 102° lens, the ultra-wide-angle view and 720P HD resolution provides image clarity for crystal-clear videos day, or night – all for £130 from **uk.ioncamera.com**.



HyperX Grows FURY Range

8GB and 16GB now added to DDR4 kits

Kingston's HyperX memory division has also been busy, and has now announced that it's adding 8GB and 16GB dual-channel kits to the HyperX FURY DDR4 range.

These new kits are available in low-latency 2133MHz, 2400MHz and 2666MHz frequencies, which are optimised for the new 6th Gen Intel Skylake platform, offering automatic overclocking for any entry-level enthusiasts looking to put together next-gen high-end desktop builds.

A cost-efficient, high-performance upgrade helping to provide faster video editing, 3D rendering, gaming and AI processing, the memory additionally features a low-profile heat spreader and can be looked up at **www.kingston.com/HyperX**.



Memory master Kingston Digital has announced the addition of a 512GB capacity to its line of Class 10 UHS-I SDHC/SDXC cards, ideal for DSLR cameras and HD camcorders to allow for the recording of more video and shooting of high-density image files without worrying about running out of space.

As well as being capable of storing thousands of photos and hours of 1080p or 3D video, the high-capacity card provides speeds of 90MB/s read and 45MB/s write.

Backed by a lifetime warranty, have a look at the range over at **www.kingston.com**.



EE Recalls Power Bars

Check for batch E1-06

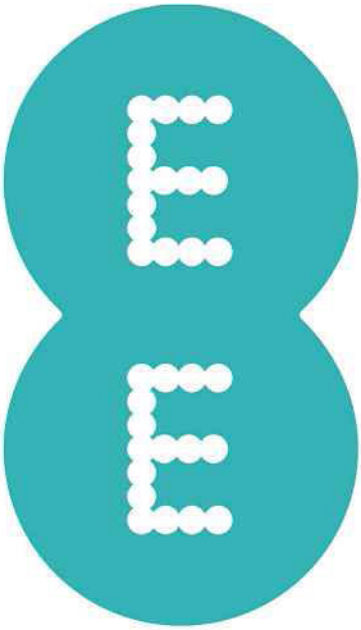
You may have heard about this already, but just in case you haven't: EE has ordered a recall on a huge batch of its Power Bar rechargers, It affects around 500,000 units, specifically those that were part of batch E1-06, and you should look at your device if you suspect you own one with this code.

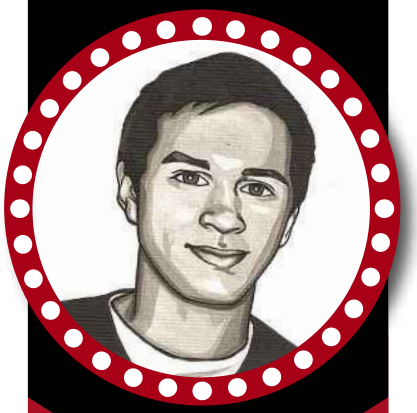
If you do, it's massively important that you return it to a store near you as soon as possible, as we're informed they pose a fire safety risk – indeed there have been media reports concerning a student who appears to have had her hands badly burned by her Power Bar.

So, if you do own one of the affected chargers here's the advice straight from the horse's mouth:

"We're requesting that customers stop using Power Bars from batch E1-06, and unplug them from handsets and the mains. They should return the Power Bar to a local EE store at their earliest convenience."

You won't get a replacement as you would have normally done, though, as EE wants to conclude its investigations before re-instigating its swap program (it likely wants to keep tabs on all the batch numbers to make sure they don't come into circulation again). Other batches are thought to be safe. The full detail can be read over at **ee.co.uk/power-bar-recall**.





You'd think in our modern, global society, we'd be able to ensure fair pricing for products regardless of what country you buy them in, but that still isn't the case. As David Crookes explains this week, in the UK we're still paying over the odds for our technology, compared to the USA.

Even taking into account importation costs and differences in taxation, the prices we're charged seem incredibly unfair a lot of the time. And for all the excuses that we get from retailers and manufacturers about why this is the case, the truth is much more simple: they charge more in the UK because they can.

The fact is that we still lap up the latest technology, even though we have to pay more for it.

Bearing that in mind, why would any company opt to charge us any less? It's annoying, but I can't see it changing any time soon.

What do you think? Write in and let us know.

Anthony

Editor

Meanwhile... On The Internet...

If you ever have the urge to play spy... please don't, but if you must, we suggest you take a look at the NSA Playset (**www.nsaplayset.org**) as a starting point. It's a project that has gone about creating and sourcing off-the-shelf equivalents to the range of options listed in the now-infamous ANT 'catalogue' (**tinyurl.com/MMnet76a**), which spelled out the wide range of options US spooks had whenever they wanted to undertake surveillance on a target.

The really scary thing about the mind-boggling range of options originally revealed by German newspaper *Der Speigel* was that they dated back to 2008, so lord knows what's on offer today. However, as Michael Ossman, one of the Playset's creators, told *Ars Technica* (**tinyurl.com/MMnet76b**) his work wasn't about enabling anyone to be as devious as the professionals, it was about alerting people to the potential range of tools that could be used against them.

"I wanted to talk about how we can build these tools – the same tools nation states use – in an open community," he said, "at least to serve as demo of threats people haven't considered before".

Shia LaBouef is just a one-man meme machine at the moment. In the toe-curling wake of his for-the-ages motivational rant (**tinyurl.com/MMnet76c**), which actually turned out to be part of a wider performance art project (**tinyurl.com/MMnet76d**) – one that the internet willfully particpated in (**tinyurl.com/MMnet76e**), elevating it well beyond the original (**tinyurl.com/MMnet76f**) – another of his forays into performance art has recently been adopted as by the online hive-mind that is Reddit.

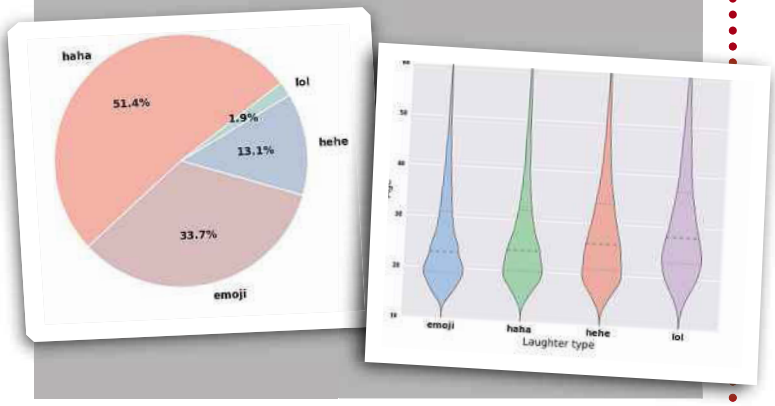
When Mr. LaBouef agreed to run a "metamarathon" comprising of 144-laps around Amsterdam's Stedelijk Museum, we're pretty sure even he didn't realise how much of a work of art his effort would be... That is if you consider a photoshop battle to be art. For it was an image of him stretching out before his run that unexpectedly went viral this week; we guess the vergence of the 'Just Do It' mantra and his rather dandy purple Nike leggings were just too much for the internet to resist (**tinyurl.com/MMnet76g**).

Regular visitors to Reddit will no-doubt be familiar with its **r/photoshopbattles** forum, that sees Redditors taking on one another in a bid to create the funniest remix of any given image. However, with the help of a Hollywood star who appears to give exactly zero damns about what anyone thinks of him, it broke out of the confines of its usual hiding place and into the wider conscience (**tinyurl.com/MMnet76h**). Top, top work all around.

While we may speak a lot about the anonymity that the internet offers, apparently the language you use can give a lot away about you. According to research undertaken by Facebook (**tinyurl.com/MMnet76j**) and inspired by an article in the *New Yorker* (**tinyurl.com/MMnet76k**) showed that not only is the once-ubiquitous "LOL" dying out as an expression of laughter across the social network, using it marks you out as being... well, a more 'mature' user.

According to some natty stat work by the site's number crunchers, there is a discernable difference between median age and the way we express laughs online; in that the median drops to its lowest among users of emoji, then rises through "haha", then "hehe" and finally "LOL".

In a helpful effort to keep us all looking younger, at least online, Guardian writer Alex Hern came up with a quick guide to being "young and down with the internet" (tinyurl.com/MMnet76l). His recommendations? Find out about using Emoji, drop the capital letters unless you TOTALLY WANT TO MAKE A POINT, de-nose your emoticons and employ heavy irony when using memes. Oh dear... Off to the nursing home with us.



Aaaaaaaaaaaaaand Finally...

It's been a while since we heard from Iron Maiden (admittedly, they've had a fair bit on their collective plates: **tinyurl.com/MMnet76i**) so, not only is it great to have them back, it's awesome to see Eddy playing some classic video games in the video to the new single *Speed Of Light* (**tinyurl.com/MMnet76m**).

.AVWhy? Videos For Your Eyes... Not Necessarily For Your Brain

It may be short, but we gotta tell you that it's pretty sweet. Courtesy of Vimeo user Björn Jónsson, you now have the chance to complete a flyby of Pluto, as he has taken the time to compile the photos taken by the New Horizons probe into a natty animation (**vimeo.com/136223988**). He compresses around four hours of flying into just 16 seconds, and appears to have used some artistic license in the adding of atmospheric effects and exaggeration the lighting on the planet's dark side, but we really couldn't care less about that.



QUICK BITS... Intel is going to provide its professional-grade Xeon processors for laptops from this autumn

Caption Competition



This was the rather weird pictured offered up as the subject for our caption competition back in issue 1374 and, as ever, you came up with some good suggestions.

- **wyliecoyoteuk:** "Now That's what I call a selfie!"
- **JayCeeDee:** "Okay, that's the operating system installed - what skin should I use?"
- **JayCeeDee:** "I'll bet Hamlet never looked this buffed!"
- **doctoryorkie:** "He wanted the male lead but his face didn't fit."
- **Thomas Turnbull**: "The new Facebook app has serious problems proving your identity."
- **Thomas Turnbull:** "The new Facebook scam was a rip off."
- **James Wade:** "The auditions for the *Face Off* sequel get underway."
- **Thomas Turnbull:** "I can see myself doing it this way but its easier and less painful using a mirror."
- **Jon Roberts:** "Robot takes off face to see if it's clean, then realises his eyes are in the wrong place."

The winner, though, was GTR2Fan with "SteamVR turns facepalm into a reality." Well done!

To enter this week, head to the 'Other Stuff' section of our forum (**forum.micromart.co.uk**) or email us via **caption@micromart.co.uk** and say something funny (but not too rude) about the picture below.



Spanish Bull Runner Spiked

The dangers of filming with a smartphone

You'll have heard of the Spanish practice of bull running. Yes, the rather crazy 'sport' of running from rampaging bulls through a town's streets to somehow prove how 'manly' you are.

While People regularly get hurt during these runs, that's rarely within the remit of a tech news page. However, a poor chap was impaled recently while attempting to film the run with his smartphone. Which kinda gives us an excuse.

The run was taking place in the Spain's Villasecra de la Sagra, and the unfortunate man was reportedly standing near a barricade to get a better look. Tragically, a stray bull separated from the pack and struck him at full pelt, ultimately killing him.

DDoS Attack Halts The International

Tournament downed by hack

The International, probably the premier big money tournament for players of Valve's popular online game *Dota 2* (the sequel to *Warcraft III* battle arena mod *Defense of The Ancients*), was hit by a mighty distributed denial of service attack on the second day of this year's event.

The calculated attempt to halt gameplay highlighted *Dota 2*'s reliance on its creator's servers and an internet connection, causing many to question why the $18m tournament wasn't taking place on a special, isolated, LAN-optimised version of the game. When you're running a big, tournament like this, delays of several hours don't look good.

Snippets!

LOLing At An End?

A Facebook study has said that more people are using "haha" and emojis over "LOL" to express laughter on the site. Turns out that over half those asked used "haha" but less than 2% use "LOL" and a third of people used emojis for expressing laughter, which makes sense we guess.

Of course, the real question is who has time to carry out this kind of research in the first place?

Stoned Cop Selfie

An Iowa resident decided to take the unusual step of taking a selfie with a police officer who was in the process of arresting him for driving while under the influence of marijuana.

Presumably, the drug use he was being arrested for was partly behind his decision to take the impromptu snap, and it's credit to to the good humoured officer for agreeing to be photographed. Indeed, the man was so pleased with his photographic efforts, he uploaded his work to SnapChat as public documents site *The Smoking Gun* then got hold of the image.

Star Wars Site Owner Strikes Back

The owner of the **starwars.co.uk** web domain has appealed a Nominet ruling that it should give it up to Disney. According to a report at the BBC, the Berkshire-based fancy dress shop has used the address for a Star Wars section of its store but it was ruled earlier this year that Disney had control of the domain name along with six others, including **starwars.uk** and **star-wars.co.uk**.

As the retailer's parent company is going to fight the ruling, oh we can't resist… The saga continues…

Google Becomes Alphabet

Restructures under new umbrella corporation...
Denies rumours of relocation to 'Hive' facility in Raccoon City

It's all change over at Google, as the firm announced a surprise restructure that has handed control of the search engine business to Sundar Pichai. Alphabet is the name of the new holding company and it will be responsible for not just Google, but also wider investment and research projects, drones and other business units such as Nest.

Why now? Well, Larry Page has said that it's to create a "cleaner, more accountable" structure now that all its associated businesses are becoming more diverse. Why Alphabet? Because, according to Page, "it means a collection of letters that represent language, one of humanity's most important innovations, and is the core of how we index with Google search". Well, quite.

All this makes very little difference to you, unless you own Google stock, but it's is huge news for a company that continues to grapple with the many strings on its mighty bow.

Carphone Warehouse Suffers Almighty Data Hack

Information Commissioner's Office now investigating

The UK data watchdog the Information Commissioner's Office is reported to be making inquiries into the leak of personal details of up to 2.4 million of its customers from a hack at Carphone Warehouse.The leak will be particularly worrying for the 90,000 customers of websites including **OneStopPhoneShop.com**, **e2save.com** and **Mobiles.co.uk** whose encrypted credit card details may have been accessed. If you're one of the people that has been affected by this, Carphone Warehouse should have been in touch by now, but you should also more generally keep an eye on your bank accounts and contact your bank company so that they can monitor your accounts, too.

According to Carphone Warehouse owner Dixons Carphone, the majority of customer data is held elsewhere so wasn't affected by this.

Prison Term For Facebook-er

Jail time for offending Thai monarchy

A man who badmouthed Thailand's monarchy on Facebook has been sent to prison for 30 years, under a law in place in the country that states anyone convicted of insulting royalty can be imprisoned for 15 years on each count.

The man in this case was found guilty of posting messages and pictures that defame the monarchy in a total of six posts on the site. He therefore actually faced 90 years in prison, if you do the maths, but the court handed down 60 years, and then halved the sentence after he pleaded guilty. This is apparently the longest sentence under the law and it also can't be appealed. Crikey.



QUICK BITS... **Apple Music has amassed over 11 million trial subscribers in a month**

Epson Debuts EcoTank

Cheap to run; high up-front price

Promising to be the UK's first branded printer that caters for refillable inks as standard, Epson's new EcoTank printers promise to provide two years' worth of ink, ultimately making them cheaper to run over the long-term. As you'd probably expect, though, the up-front cost of the models themselves aren't especially cheap, starting at around £220.

However, considering you won't need to buy any ink cartridges for two years – as this has an integrated ink tank system and no cartridges – the idea is that you'll be laughing all the way to the bank.

When you do eventually run out of ink, you can get a set of replacements for a little over £30. Epson claims that this means you'll save as much as 65% on your printing costs, providing that you're doing a significant amount of printing.

This could certainly be worth a look for some, though for casual printing, it probably isn't going to be worth the initial outlay. Anyway, **www.epson.co.uk** is the website to hunt for.

Windows 10 Interface On Xbox One In November

Gamescom announcement confirms move

Microsoft used this year's Gamescom's event to announce that the Windows 10-based upgrade for the Xbox One is indeed coming in November.

One of the big ideas behind the upgraded interface is to make it easier to access games and socialise with gaming mates, plus this new update will bring Cortana support and Xbox 360 backwards compatibility.

In other news for the console, a Chatpad accessory is also due for release in November. This backlit full QWERTY keypad (pictured here) plugs directly into the Xbox One wireless controller and also includes a Chat Headset with 3.5mm jack that you can plug directly into the Chatpad. The add-on board will cost £30 and you can see this in all its glory at **www.xbox.com**.



HTC Fingerprints Stored

Researchers access unencrypted data on phones

Experts from security firm FireEye have discovered that the HTC One Max stored fingerprint data an an unencrypted world-readable file.

While HTC was quoted in reports as saying that the flaw has since been fixed, biometric data images such as this are obviously used in many smartphones these days so it's really quite worrying that researchers have found this very serious issue. The researchers told people of their findings at the Black Hat security conference in Las Vegas and the advice is for people to keep their phone's OS up-to-date in order to protect from any security nasties.

Well, duh!

External Xbox One Drive

Exclusive from Seagate

Seagate has revealed the Game Drive, an exclusive external drive for the Xbox One and Xbox 360 consoles.

The Game Drive is a USB 3.0 unit housing a 2TB capacity drive and it's a rather striking shade of green, understandable given that it's for the Xbox systems. The plug-and-play setup promises to "get you up and running in seconds" and will let you store up to 50+ games. The drive also doesn't need any power cable so you can take it to a mate's house or take it on your travels if necessary.

Pricing is around £100, although it was out of stock the last time we looked. Head for **www.seagate.com** to see if you can pick one up.

MSI Z170A Gaming 5

All aboard the Skylake!

DETAILS
- **Price: ~£150**
- **Manufacturer: MSI**
- **Website: goo.gl/PkP9Gn**
- **Requirements: 6th Gen Intel processor, DDR4 RAM, Windows 7+ for software**

The 6th generation of Intel processors, Skylake, is creating quite a stir among the community. So far the reviews coming in are good, and it's proving to be a powerful platform, especially the Core i5-6600K. So to take best advantage of a Skylake CPU, you're going to need a motherboard that can not only perform brilliantly, but also provide you with every advantage the new technology has to offer.

You won't go far wrong with MSI's new Z170A Gaming 5 motherboard under the processor. This impressively presented, red and black themed, MSI dragon logo embellished motherboard is a joy to behold. It's not just the aesthetics that make it stand out from the crowd, though.

The four DDR4 RAM slots offer a maximum of 64GB of system memory, with the potential for running at an overclocked 3600MHz. There are three PCI-E x16 slots for multiple GPUs, with each having the MSI Steel Armour upgrade applied that protect against electromagnetic interference, and four PCI-E x1 slots. Fitting two cards will lower the speed of the first two PCIe slots to x8, and a third GPU will offer x4 at the bottom PCI-E with x8 remaining on the first two.

Furthermore the Z170A Gaming 5 features six SATA III 6Gb/s ports, and a pair of M.2 ports for either PCI-E or SATA M.2 SSDs. Interestingly we noticed that the M.2 ports on the Z170A are mounted slightly higher than normal. This, we assume, is to cater for newer M.2 SSDs with 3D V-NAND setups, where they're slightly thicker than previous M.2 drives.



The MSI Z170A Gaming 5 motherboard is an impressive thing of beauty



With USB 3.1, dual M.2 ports and plenty of other future technology, there's a lot here for the end user

The rear I/O ports aren't lacking in clever designs and features either. You'll find a PS/2 port, a pair of USB 2.0 ports, DVI, HDMI, optical out, a Killer Gaming gigabit Ethernet port, and four USB 3.1 Gen1 ports including the newer USB 3.1 gen2 Type-A port and a reversible type-C USB port.

There's a lot of attention to detail on the Z170A Gaming 5. The heatsinks are well placed around the CPU to minimise any problems that may arise from over-large CPU coolers, and of course this and the rest of the Z170 range include titanium chokes and better designed capacitors that we've come to expect from an MSI board.

The list of overclocking and gaming-specific features is quite extensive, and includes such elements as programmable hotkeys that will activate an overclocking profile for an extra in-game boost. There's also Nahimic sound technology and the Killer Gaming LAN manager with optimised bandwidth and traffic priority settings.

The overclocking abilities are immense with an appropriate Skylake CPU fitted, as we're told it's almost like going back to the old days of Socket 775. Getting an i5-6600K up to 4.2GHz was a breeze using the MSI UEFI BIOS settings, and that was air cooled. With a more elaborate setup you could easily hit 4.5GHz and probably beyond, depending on the CPU. With an Nvidia GTX970 installed, along with 16GB of DDR4 memory, we managed to clock a decent score of 9901 with the 3DMark's Firestrike.

This is without a doubt one of the most impressively designed and well featured motherboard we've tested in some time. There's loads we haven't even got the space to mention, and the software suite deserves a review of its own. For around £150, you'll be getting an extremely capable, state of the art motherboard that's head and shoulders above the competition.

mm **David Hayward**

Quite a remarkable Intel 6th generation motherboard, with amazing features



TRENDnet 4-Channel HD PoE NVR Kit

Top notch surveillance has never been so easy

DETAILS
- **Price: ~£350**
- **Manufacturer: TRENDnet**
- **Website: goo.gl/BwBbZA**
- **Requirements: Monitor needed for output, various tools for mounting, internet for remote access**

Home surveillance has become quite an interesting market over the last couple of years. Whereas the home user previously had little choice but to opt for complex and expensive equipment, they can now get commercial quality surveillance from a range of suppliers at affordable prices.

We've seen a few examples in *Micro Mart* recently, from single camera USB, Ethernet and wireless options, to DIY-ish solution using a Raspberry Pi. Now, though, we're lucky enough to have something a little more powerful and comprehensive to try out.

The TRENDnet 4-Channel HD PoE NVR kit comes with plenty of goodies: a pair of TV-IP320PI 720p outdoor cameras, a TV-NVR104 network video recorder with a pre-installed 1TB hard drive, two 30m Ethernet cables, a further 1.8m Ethernet lead for hooking up to your local network, a 1.8m HDMI cable, an optical mouse, power adapter, a collection of installation guides and a CD with the user guide on it. It's quite the package, with each component neatly and individually boxed.

Starting with the cameras, the lens of each has a focal length of 4mm with a progressive scan CMOS -inch sensor. There are good viewing angles, a fast shutter speed, 720p HD recording capabilities, and tough weather resistant housing. Each has a 100Mb/s PoE port, complete with the kits necessary for all manner of wall mounting.



The provided pair of cameras are of excellent quality



The network video recorder can use a further two, auto-detect, TRENDnet cameras

The control box, as we already mentioned, has a pre-installed 1TB hard drive, on to which you'll be able to record many hours of HD footage taken from the cameras. It has four PoE Ethernet ports, two of which will be used by the included cameras and two left spare for further upgrade to a four-camera setup.

There's also a 100Mbps network port for hooking up to the LAN, a pair of USB 2.0 ports, HDMI, VGA, and a pair of analogue audio ports. Once everything is connected, you'll be able to view the feed from the cameras in a split-screen arrangement, or view any of the previous eight-day recordings.

Setting everything up can take some time, especially if the locations are a little out of the way. The length of Ethernet cables provided is good, though; 30m is towards the upper limit for Ethernet, but even at the maximum distance you should still get a good feed.You'll need to drill a hole through a wall, or wherever you're installing the cameras, to feed the Ethernet cable through, however – though, thankfully, since the cameras are Power-over-Ethernet there's no need to provide power.

The setup is pretty impressive. The quality of each component is very good, especially the cameras, and the end result is similarly good too. There are a few points that could with being improved upon, perhaps. Gigabit Ethernet across all the components, mainly the TV-NVR104 would greatly improve the access times. And maybe a wi-fi option for the cameras wouldn't go amiss either.

Despite those minor points though, the TRENDnet 4-Channel HD PoE NVR kit is more than capable of satisfying the home or small business user who needs top quality surveillance for their premises. It's easy to set up too, thanks to the network video recorder being able to auto-detect TRENDnet cameras. The options to access the feed are too many to list, as are the individual features, but suffice to say there's a lot on offer here for the asking price of around £350.

mm David Hayward

An impressive setup for those who need quality surveillance



Netgear Nighthawk D7000 VDSL Modem Router

Netgear finally brings the D7000 Nighthawk VDSL router in for a UK landing

DETAILS

- **Price: £165 (Scan)**
- **Manufacturer: Netgear**
- **Website: www.netgear.co.uk**
- **Requirements: Broadband connection using VDSL, VDSL2, ADSL, ADSL2 or ADSL2**
- **Model: Nighthawk D7000-100UKS**



It might be shaped like a Stealth Bomber, but there isn't much that could obscure Netgear's D7000 Nighthawk VDSL/ADSL model router. It's big, utilises three massive 'aerodynamic' antenna and is 28.5cm wide, 18.5cm deep and 5cm tall. Thankfully, it can be wall mounted; though, sadly. Netgear don't provide the screws for doing this job.

The D7000 is really all about what's on the inside, however. Facilities that our American friends have enjoyed for a while, and now we get here in the UK.

Key Features

- Extreme wi-fi speed-Up to 1.9Gbps
- 1GHz dual-core processor
- Built-in DSL modem is also compatible with VDSL, VDSL2, ADSL, ADSL2, & ADSL2+
- Fast VDSL2/ADSL2+ modem for fibre broadband
- Beamforming+ - Faster, more reliable connections
- High-powered amplifiers and antennas to extend your wi-fi coverage
- Twice the USB storage access and faster connections using two USB 3.0 ports
- Gigabit Ethernet WAN port provides universal compatibility with any Internet service
- NETGEAR genie App – Easily manage, monitor, and control your home network from PC, tablet, or smartphone

Except this D7000-100UKS has been somewhat redesigned to our specific needs, and the modem part of the package is therefore compatible with VDSL, VDSL2, ADSL, ADSL2 and ADSL2+.

That covers most of the UK broadband bases, as it works with ordinary ADSL as well as BT infinity and Talk Talk Fibre. For those using Virgin, there's a Gigabit WAN socket into which you can plug their cable modem.

With the modem side well ticked, the other half of this story is the wired and wireless combo, and here the D7000 doesn't pull any punches. This is an AC1900 specification access point, which at this time identifies the internal chip as the Broadcom BCM4708A. This little communications monster boosts 802.11n performance by offering Turbo QAM mode, hiking bandwidth over 2.4GHz from 450Mb/s to 600Mb/s. When combined with the 5GHz channel, there's a theoretical cap of 1900Mb/s under 802.11ac. Although, as the router only had gigabit wired hub, it's debatable if it would





be possible to ever fully utilise that capacity.

In the brief time I spent with the D7000, I can confirm that in most respects Netgear got more things right here than wrong.This is very easy hardware to setup, even if you don't use the Netgear Genie tool or EZ Mobile Connect QR codes. Performance is generally very good, as you might expect with a device that supports beamforming+.

The original US version had a single USB 3.0 and another USB 2.0 port, but in the UK we get two USB 3.0 ports. Supposedly to make this more, useful Netgear gave the D7000 a 1GHz dual core ARM processor, not unlike most entry level android phones come with these days. I'm not sure what the impact of this processor has on overall system performance, because it doesn't really unleash the true power of USB 3.0 technology in my testing.

Using a Sandisk Extreme USB 3.0 key that can achieve 270MB/s reads, I got just 17MB/s writes and 45MB/s reads. That's a little better than USB 2.0 (on reads only), but less than 17% of what the device was actually capable when directly connected to a PC. I'm still waiting for a router with USB 3.0 ports to justify having them, but the ports on this one are at least well positioned for easy access.

What I did like was a small bump in Internet connection speed over my BT Home Hub 5, a device that I've long concluded isn't as good as BT might like to suggest. For those on Infinity or Talk Talk Fibre this will definitely feel like an upgrade, even if it isn't an inexpensive one over the *de facto* router options.

Where I'm less impressed with this design is in the context of small business use, where there are some rather obvious omissions. One of these is the very limited VPN support, as it only offers OpenVPN and that won't handle some connection scenarios. My other concern is the regularity of firmware updates for this hardware, given that there is an included slip of paper noting issues on O2 and BE dated 2010! Surely this note shouldn't be with this modem, as the issue it refers should have been fixed some years back?

Those points aside, this is a mostly fine piece of technology for home use, that we'd recommend to anyone who wants to get the most out of their broadband connection. While we waited a little longer over here compared to the earlier US release, the UK version of this design seems superior in most respects, and hopefully the firmware has also matured.

> **"The only serious complaint is the price, as this isn't a minor investment"**

The only serious complaint is the price, as this isn't a minor investment however you look at it, and the similarly specified ASUS DSL-AC68U is £25 cheaper.

mm Mark Pickavance

A big beast of a VDSL modem router



Smanos Smart Home System

All round protection from a name that is new to our reviewer

DETAILS
- **Price: £206 (with camera)**
- **Manufacturer: Smanos**
- **Website: www.smanos.com**
- **Requirements: n.a.**



While Smanos might not be a company with which you are too familiar, its product range could be of interest. Forming part of its Smart Home System line up, Smanos has developed its wi-fi alarm system, which can be paired with the company's IP6 HD wi-fi camera.

Consisting of a W020 control panel, two DS2300 door/window detector contact units and a RE2300 remote control unit, the wi-fi alarm system can be set up to protect entry points to your home from unauthorised access with an ear-splitting siren and an electronic message.

Acting as the central hub of the system, the plinth-shaped control panel is powered via the mains with back-up being provided by four AA batteries, which slot into a compartment on the base of the unit. For some reason, Smanos has gone with a diamond-shaped power plug (the same as with the IP6 camera) requiring more mounting space – which may cause a problem by blocking an adjacent power plug socket.

The control panel needs to be integrated into the home network using a downloaded app available for Android and iOS platforms. Detailed instructions regarding the set up are provided in the manual, but it's a two-stage operation where the smartphone links to the control panel, which then creates a bridging link.

Contact units, which are white in colour like the rest of the kit, are made up of elements that act as a transmitter and magnet. These elements need to be placed either side of a closed opening, such as a door or windows, using supplied double-sided tape. It is advisable to position the two elements before they are activated otherwise your ears could be assaulted by a siren if they are separated by more than 2cm. The siren is capable of emitting audio at a level of 105dB.

The supplied detector units are already paired to the Control Panel, as is the remote control unit, while further units can be added as required. The Control Panel can handle up to 30 contacts and 10 remote control units requiring a pairing process.

Various settings can be adjusted using the app. Each of the detector contacts can be given an appropriate name indicating their location and assigned to one of these supported zones of Home, Normal or 24-H. You can also adjust the volume level of the siren and set timing delays allowing you to disarm an accidental activated alarm. The remote control unit allows you to arm or disarm features and send an SOS message to a linked smartphone. Unfortunately my smartphone failed to receive the SOS message.

The IP6 HD wi-fi camera, white in colour, can either be free-standing or wall-mounted with screws and rawl plugs supplied for the latter mode. A similar process, using a downloaded app, is required when adding the camera to a home network to provide 720 HD live video over wi-fi. Featuring a Sony CMOS sensor and 2.4mm F2.0 lens, the camera has a built-in microphone for communicating with those on camera.

While there is no cloud storage facility with this package, the camera does have a micro SD card slot for inserting a memory card with a capacity of up to 32GB. Content, whether still images or video clips, activated manually or automatically captured every 20 minutes., is stored on the SD card Later recordings will replace those made earlier when the card reaches its capacity.

mm Michael Fereday

An all-round protection system for the security conscious



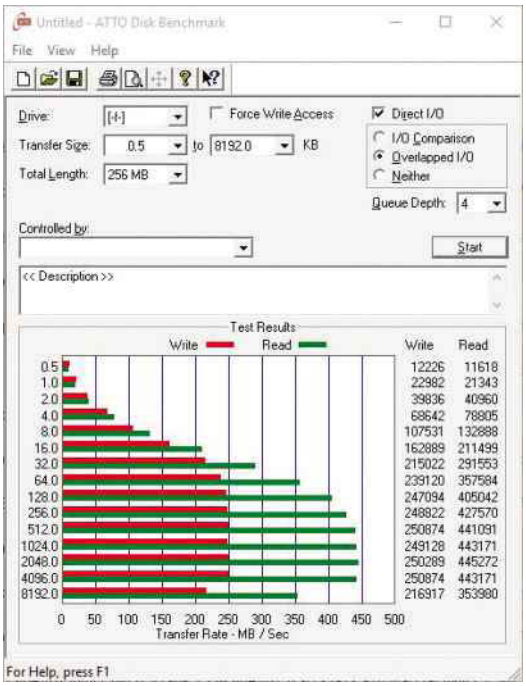
Transcend ESD400 256GB Portable SSD

Ultimate portable storage speed in a pocket-sized device

DETAILS
- **Price: ~£100**
- **Manufacturer: Transcend**
- **Website: goo.gl/05rEtE**
- **Requirements: Spare USB 2.0 or 3.0 port, Windows XP or Mac OS X for Elite Data**



The Transcend ESD400 is a small, but capable drive



The ATTO results are good, better than most other portable solutions

It's not uncommon now to hold hundreds of gigabytes in your pocket, but there are often limitations to large USB sticks and the like. However, Transcend may have a solution. The ESD400 is a portable Solid State Drive with capacities ranging from 128GB up to 1TB, with our review model being the 256GB version; all of which support superfast USB3.0 to UASP (USB Attached SCSI Protocol) with the potential to hit read speeds up to 410MB per second, and write speeds of 380MB per second.

It's an SSD in an enclosure, thus devoid of moving parts and extremely light, weighing just 56g, and is a pocket sized 92 x 62 x 10.5mm. The enclosure is a toughened matt black plastic, with a polished and decorated front panel emblazoned with the Transcend logo and a small activity LED located in the upper left. The top of the ESD400 houses the UASP connection and a single one-touch backup button, which when used in conjunction with the Transcend Elite Data Management Software will initiate an instant auto-copy and synchronisation.



With up to 1TB capacity, there's plenty for all types of user

The drive and case are capable of withstanding more than their fair share of knocks and exposure to environmental elements, far more than most off the shelf USB sticks can. In the box you get the drive itself, a 450mm USB3.0 to UASP cable, a stylish soft Transcend logo printed carry case, and the warranty card. It may not sound like much, but since this is a pre-formatted FAT32 OS independent device there's little need to clutter the packaging with unnecessary waste. Plus, it's only got a single connection so there's little need for requiring instructions or a quick start guide.

In terms of performance, the ESD400 is fairly quick. The ATTO benchmark we ran scored a decent 353MB per second on the read test, and 216MB per second on the write test – both with the 8192KB transfer size. The 4096KB transfer test yielded a better result, with 443MB per second read, and 250MB per second write. All numbers that are good for a portable drive.

The Transcend Elite Data Management Software, for both Windows and Mac, adds backup and restore functionality, along with encryption, bookmark syncing and file/folder syncing as configured through the UI. It's an effective set of tools, but you don't need them to get the best out of the device.

This is an impressive, quick, convenient storage device. Its uses are many and varied, especially where fast access is essential, but it's also a real contender for rapid backups.

mm David Hayward

Blistering performance in a compact and stylish portable device



Idol 3

What's in a name, especially when it is a homonym?

DETAILS
- **Price: £200**
- **Manufacturer: Alcatel OneTouch**
- **Website: www.alcatelonetouch.com/uk**
- **Requirements: n.a.**

With a title best seen rather than heard, the Idol 3 is a 4G smartphone handset from Alcatel OneTouch. This product is available in either 4.7" or 5.5" screen formats. My review unit is of the larger size.

With dimensions of 152.7 x 75.1 x 7.4mm (H x W x D), the Idol 3 follows the standard smartphone look of a device whose front is dominated by the 5.5" capacity touchscreen. The appearance of the handset, with its dark grey body and silver faux trimming, is reasonably appealing.

Delivering a resolution of 1080 x 1920 pixels, the screen is best in artificial lighting conditions. I often struggled to read it in bright sunlight. The plethora of finger smears on the screen certainly did not help when viewing .

While the handset felt comfortable, there was one aspect of its layout that I found difficult to adjusti to. Other smartphones I have used tend to position the power and volume rocker on the same side of the unit, but this model has the volume rocker is on the right while the power button is located on the left. More conventionally positioned are the 3.5mm jack socket on the top of the unit for the supplied headset and a micro USB port on the base for charging the fixed





Li-ion 2910mAh battery which managed over nine hours of video playback during tests.

Positioned below the power button is a small tray concealed within the body of the handset.

> **"The screen is best in artificial light. I struggled to read it in bright sunlight"**

This tray is released from the body of the unit using a small pin tool. Once the tray has been released, you can insert the SIM and an optional micro SD card. Completing the external features of the Idol 3 are an 8MP front-mounted camera, 13MP rear-mounted camera with flash unit plus two front-mounted speakers.

Whether using the front or rear camera, you have a choice of modes that include Auto, HDR, Pano, Time Lapse, Scanner and Face. For some reason the default setting for the rear camera is 10MP at 16:9 aspect. This can be change to 13MP at 4:3 aspect for content captured at 4128 x 3096 pixels. I felt the quality of captured images was perfectly acceptable.

At the heart of this handset is a Qualcomm MSM8939 Snapdragon 615 processor, which can call upon a quad-core 1.5GHx Cortex-A53, quad-core 1,9GHz Cortex-A53 and Adreno 405 modules. There is 2GB of RAM with 16GB of storage space of which 9.08GB was available once Android Lollipop and other installed apps had taken their fill. Using the micro SD card option, you can increase storage up to 128GB which should be ample for most users.

An initial four-pane Home screen presents the user with icons for Apps, Games, Radio, Mix, Camera, Play Store and Google. There is also a Favourites tray populated with phone, messaging, applications list, email and browser links. From this screen a swipe to the right reveals a choice of wallpapers while a swipe to the left provides access to links categorised as tools, social, media and assistance. Those new to the smartphone arena will appreciate this feature.

Another feature that could well appeal is that the Idol 3 will automatically adjust the screen layout so, regardless of the way you pick up the handset, the display will appear correct rather than sometimes upside down. This is in addition to the more usual standard switching between portrait and landscape orientation.

A handset you would not be ashamed to be seen using.



Xenta Washable Waterproof Wired USB Keyboard

Xenta aims to snag those customers who splash out on their keyboards

DETAILS
- **Price: £25 (Ebuyer)**
- **Manufacturer: Xenta**
- **Website: www.xenta.co.uk/computing/keyboards-mice/**
- **Requirements: Windows XP/Vista/7/8/10, USB port**









When I unpacked the Xenta Washable Waterproof keyboard I had a brief déjà vu moment. Like the ones you get if you watch any of the news channels for more than 20 minutes in a row. Eventually the penny dropped, because this keyboard or one disturbingly like it is sold by Logitech as the K310 for about £10 more.

What this product seems designed for are those people who are messy eaters and like to have lunch at their desks, or who have a system where the keyboard is exposed to the elements for whatever reason. Because, other than that – save for, maybe, a system on a boat or at a bar or beer festival – I can't think of many situations that justified needing a keyboard to be waterproof.

The approach here is to avoid having somewhere for liquid to pool under the keys, instead choosing to make them stand proud of a smooth flat surface.

Therefore, should someone drop their beer/coffee/tea/deadly pathogen on the keyboard it can easily run off, and you can wipe down the structure relatively easily. Should it be something thicker, cup-soup comes to my mind, you can immerse the whole keyboard in up to 6" of water for a proper wash. For stubborn detritus, Xenta includes a small brush for you to get beneath and between the keys. As an added protection there is also a waterproof cover for the USB blade, though that does sort of suggest you're using it generally not plugged in, confusingly.

Having used this device, I was pleasantly surprised that I could actually get up to a reasonable typing speed. Performance is everything to me, and the key action on this is generally positive and the key reset quick, if a little squishy.

It could be better in a couple of areas, I'd suggest. One of these is that the tops of the keys are only slightly dished compared with most USB keyboards, and could do with being more sculpted. The other is that the some fold out legs that raise the rake don't have any rubber feet on them, causing the keyboard to slide awat if you have a smooth table top. Thinking on it, an integrated USB hub might have been nice too, but you can live without that feature.

Overall, this is a much better keyboard than I was expecting it to be, even if I'm still unsure who buys a keyboard with the expectation that it will get wet on a regular basis.

If that is you, however – and please spare me the detail about why – then this keyboard might well be perfect. It's reasonably priced too compared with other contamination resistant designs.

mm Mark Pickavance

Features
- No setup required just plug&play
- Fully submergible up to 6"
- Durable keys up to five million key strokes
- 1.5m USB cable
- Adjustable height
- Full-size UK layout
- Low profile quiet operation keys
- Windows & Mac Compatible

A modestly submersible USB keyboard



GROUP TEST

M.2 SSDs

M.2 is the new super small solid-state storage technology that's currently taking benchmarks by storm. At only the size of a stick of chewing gum, these drives comes in various capacities and offer faster than normal SSD speeds.

David Hayward has six M.2 form factor SSSSDs (super small solid-state drives – we're going to trademark that) on test, to see which out-performs the otherw and which offer the best value for money.

Samsung 120GB 850 EVO M.2 SSD

DETAILS
- **Price: £55**
- **Manufacturer: Samsung**
- **Website: goo.gl/fqYP69**
- **Requirements: M.2 port, Windows 7 or later**



The Samsung 850 EVO 120GB M.2 SSD is a good, entry-level M.2 drive



Performance is quite reasonable as well

Samsung has embraced the new M.2 form factor with a will, incorporating the company's 32-layer TLC 3D V-NAND technology as well as other features such as TurboWrite Technology and RAPID Mode.

The technology used is certainly quite interesting, but to begin with this example from Samsung comes in three available capacities – 120GB, 250GB and 500GB – all of which use the Samsung MGX controller.

The 850 EVO M.2 SSD measures 22 x 80 x 3.8mm and weighs around 6g. The obvious advantage of M.2 is the diminished size and weight, making them an excellent upgrade option for smaller systems and laptops. The interface is SATA 6Gbps, compatible with SATA 3Gbps and 1.5Gbps connections, with an average power consumption of around 2.3W and a reliability of 1.5 million hours.

Further to the technology we mentioned earlier, the 3D V-NAND architecture is something entirely new. The process involves stacking 32 cell layers vertically, which will result in a higher density and, in theory, better performance within a smaller footprint.

The TurboWrite Technology claims to increase the read and write performance of the 850 EVO by up to twice its current specification, resulting in an on-paper read speed of 540MB/s and an equally impressive write speed of 520MB/s.

And finally, RAPID Mode uses Samsung's Magician Software to utilise unused system RAM as a high speed cache, supporting up to 4GB cache on a PC with 16GB or more RAM.

In real-world terms all this amounts to an SSD that sounds very intriguing. Our ATTO benchmark certainly came back with some decent numbers. The 8192KB transfer test recorded 550MB/s read, while the same size transfer recorded a write speed of 517MB/s. The smaller sized 4KB transfer managed 351MB/s read and 302MB/s write – both of which are pretty good by SSD standards.

Interestingly, with the RAPID mode used, in a system with 16GB of memory installed, the numbers didn't alter at all, even when run several times. In fact, on one occasion they dropped ever so slightly. Benchmarks are odd things to pitch against a real-world scenario though. Our copy of Windows 10 was booted to the desktop in less than five seconds (after clearing the BIOS), and everything we used within the OS felt snappy and extremely quick.

As an upgraded system drive the Samsung 120GB 850 EVO M.2 SSD is a fantastic choice. 120GB may be a little limiting as the only drive in the system, though, so you'll probably need to include a second drive somewhere along the line. Thankfully, the 120GB 850 EVO version only costs £55, which is pretty cheap, so factoring in a second storage medium won't break the bank.

Overall, a good performer and an ideal upgrade for any system.



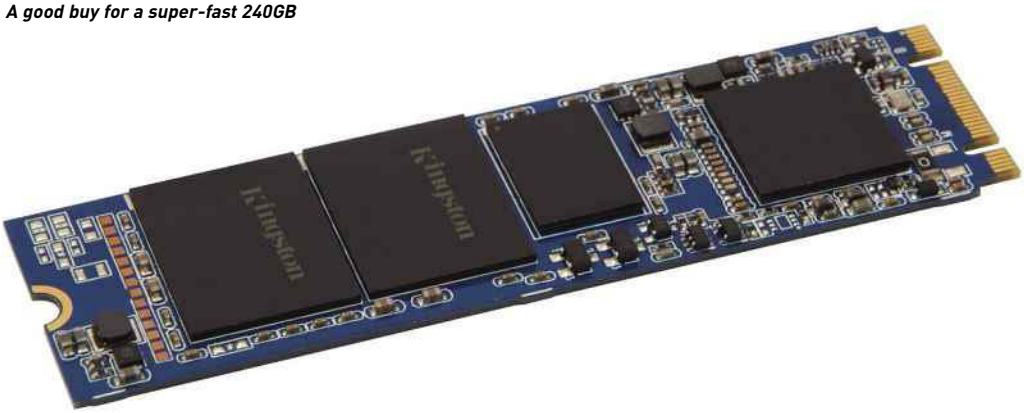
Kingston 240GB SSDNow M.2

DETAILS
- **Price: £100**
- **Manufacturer: Kingston**
- **Website: goo.gl/qO2WZl**
- **Requirements: M.2 port, Windows 7 or later**



▲ *The Kingston 240GB SSDNow: a very capable M.2 drive*

▼ *A good buy for a super-fast 240GB*



Kingston has enjoyed a couple of years with M.2 now, with the launch of the SM2280 range. The 120GB version came first, followed some time later by the 240GB we have to review in this instance.

Not a huge amount has changed with regards to this model, but there's still a lot to appreciate from this slightly older M.2 example.

The Kingston 240GB SSDNow M.2 is a standard M.2 form, hence the 2280 model number, meaning it measures 22 x 80 x 3.5mm, while weighing 7.3g. In terms of technology used, the Kingston 240GB SSDNow uses a Phison PS3108-S8 SATA-3 controller – again, another SATA 6Gbps controller and not the newer PCIe controller.

Features include a firmware-based power loss protection technology to maintain data integrity in the event of a total loss of system power. According to the Kingston specifications, the drive makes sure that the data in the cache is constantly flushed to the NAND, so any loss of power will result in a marginal loss of data, better aiding the drive to recovery once the power is restored.

There's also a power saving feature hard-wired into this Kingston model, with measured power consumption of 0.06W when idle, 0.1W average, 1.01W maximum read and 3.08W maximum write. And the life expectancy is rated at one million hours.

Support for TRIM and S.M.A.R.T. as well as Intel's SRT polish off an otherwise well-specified storage device, although it doesn't feel quite as well technology-supported as the Samsung 850 EVO. However, our ATTO benchmark showed some surprising results. The read speed for the 8192KB transfer test came back with 554MB/s read and 533MB/s write, both of which beat the Samsung model by 4MB/s and 16MB/s respectively.

The smaller 4KB transfer recorded a read speed of 323MB/s and a write speed of 251MB/s, which evened out the scores somewhat, with these numbers being less than the Samsung 850 EVO.

As before, in the real world, Windows 10 booted extraordinarily quickly, about the same as the Samsung. And as before, the OS and everything we ran felt quick and responded as one would expect from a decent SSD.

The extra 120GB on top of the Samsung model is certainly more beneficial. While you could get away with the 120GB Samsung as a lone storage device in a system by the skin of your teeth, the 240GB Kingston left some breathing space for gaming, media and the usual office-like duties. However, to be fair, you'll probably need a good terabyte as a secondary drive for the future.

The Kingston 240GB SSDNow M.2 is a good NAND storage device for both laptops and desktops. A decent enough capacity combined with good read and write scores makes this one to consider for your next upgrade. At just £100, it's not too badly priced either, although newer systems will probably benefit from a more modern PCIe controller rather than the original SATA 6Gbps.



HyperX Predator 240GB PCIe M.2 SSD

DETAILS
- **Price: £180**
- **Manufacturer: Kingston/HyperX**
- **Website: goo.gl/u3acPZ**
- **Requirements: M.2 port or PCIe slot, Windows 7 or later**



It's quite pricey and only performs the same as a normal M.2 SSD at lower transfer sizes

This is the second Kingston model in the group and one from the company's HyperX performance range of products.

As you can also no doubt tell, this is the first of the newer PCIe M.2 SSDs in the group. Naturally, as PCIe slots are faster than SATA, in theory we should see some pretty impressive numbers when it comes to the benchmark.

First off, though, the HyperX Predator comes in a large box and is actually mounted on the front of a PCIe card, screwed in place but removable should your system already have an appropriate M.2 interface. Interestingly, the PCIe card that the HyperX Predator is initially mounted to also comes with a full and half-height backplate, so you can fit to discrete and low-profile systems.

The actual M.2 drive itself is the standard size, measuring 22 x 80 x 3.5mm and weighing around 10g. Power consumption is rated as 1.38W when idle, 1.4W average, 1.99W maximum read and 8.25W maximum write. Again, Kingston rates the lifespan of the drive to one million hours.

The Marvell controller powered HyperX Predator states some pretty big numbers on the box, boasting transfer speeds of 1400MB/s read and 1000MB/s write.

Our ATTO benchmark did differ, but only ever so slightly. The 8192KB transfer test recorded an eye-watering read speed of 1426MB/s, while the write speed came back with 916MB/s. The smaller transfer size of 4KB was a little less impressive, with a recorded read speed of 305MB/s and 290MB/s write.

> **"The bigger transfer speeds weren't too far from the claims on the box"**

The bigger transfer speeds weren't too far from the claims on the box, but it's interesting to see that the lower-sized transfer speeds didn't differ that much from the other M.2 SSDs we've so far looked at.

Nevertheless, the HyperX Predator certainly gave our system a much needed kick up the backside. Windows 10 was booted (again, once we got past the initial BIOS) before we could even sit down, and the entire system was as speedy as you'd expect.

The HyperX Predator currently comes in two capacities: the 240GB version that we had to test and a 480GB version. There are rumours that a 980GB+ version is going to be made available in the very near future, but as of yet we don't know if that's for certain.

The only downside to owning a HyperX Predator 240GB PCIe M.2 SSD is the fact that you'll have to fork out £180 for one. That's quite a lot of money for a mere 240GB, regardless of the benchmarks you'll no doubt see once the thing is installed. Of course, if you can afford it, then you'll be in for a treat, but for the rest of, we're not sure the cost at present justifies the extra speed.



The HyperX Predator is an incredibly fast M.2 PCIe M.2 SSD



Transcend MTS400 M.2 SSD

DETAILS
- Price: ~£90
- Manufacturer: Transcend
- Website: goo.gl/XLmzvE
- Requirements: M.2 port, Widnows 7 or later

The Transcend MTS400 is a remarkably compact SSD, which comes in four different capacities: 32GB, 64GB, 128GB and the 256GB one we're reviewing in this instance. It weighs around 4g and measures just 22 x 42 x 3.5mm, roughly half the length of the previous 'gum-stick' M.2 SSDs we've looked at. The power consumption is around 0.5W when idle, rising to 3.7W when reading and 4.4W when writing; life expectancy is rated at 1.5 million hours.

This particular model uses Transcend-designed firmware and a TS6500 controller (a rebranded SM2246EN). Other features include Power Shield to help prevent data loss in the event of a loss in power, flushing the cache in a similar way to the Kingston 240GB SSDNow model. DevSleep is also fully supported, dropping the power used and closing down the SATA connection to conserve the battery.



The Transcend MTS400 is a good performing M.2 SSD



It's reasonably priced and more than a match for the competition

> **"The Transcend MTS400 M.2 SSD is a good all-round and quick storage device"**

In addition to this, the MTS400 supports Intel Smart Response Technology, where you're able to configure the SSD to work as a memory cache between the hard drive and system memory. It's an interesting technology, although to be fair you probably wouldn't want to waste 256GB of SSD storage purely as a cache. Thankfully, the 32GB and 64GB models also support this feature, which could prove more beneficial

The read benchmark from our ATTO test with the 8192KB transfer was 563MB/s, while the write speed was 328MB/s – generally good numbers for an SSD, but the write speeds are quite low compared to the other SSDs on test. The smaller transfer sizes proved to be good too: read speeds for 4KB were 301MB/s and write at 4KB was 260MB/s.

The benchmarked speeds were more or less in line with the other models on test here, except for the PCIe HyperX Predator for the 8192KB test. It's interesting to see the lesser write speed of 328MB/s, while the read speed in the same test was 9MB/s faster than the Kingston 240GB.

Either way, the Transcend MTS400 fared well against the other drives we have. For around £90, it's reasonably priced, and the smaller size is certainly a plus for those who are limited on space.

To conclude, then, the Transcend MTS400 M.2 SSD is a good all-round and quick storage device that will no doubt serve you well. Plus you get an extra 16GB of space for £10 less than the Kingston model.



Patriot Ignite 480GB M.2 SSD

DETAILS
- Price: £170
- Manufacturer: Patriot
- Website: goo.gl/v6IfkN
- Requirements: M.2 port, Windows 7 or later

This drive from Patriot is a SATA-3 SSD, using a Phison PS3110-S10 controller, and it measures 22 x 80 x 3.8mm and weighs 9g. Power consumption is 0.25W when idle, 1.1W average, 2.1W maximum read and 5.7W maximum write. Patriot rates the lifespan of the Ignite at a good two million hours, though.

There are some interesting features inherent to the Patriot Ignite, such as End-to-End Data Path Protection, Advanced Wear Levelling and Advanced Garbage Collection. There's also SmartFlush, GuaranteedFlush and SmartECC. What these all mean of course is that the controller and firmware is loaded with all the latest specifications; you'll have to look them up individually, as they're a little too much to get into here. In real-world terms, they are beneficial, but there's a pretty good chance the average user won't ever notice the behind-the-scenes technology at work.

We were quite amazed when we ran the ATTO benchmark on the Patriot Ignite, as the numbers were nearly exactly the same as the Transcend MTS400. The 8192KB read test recorded a score of 563MB/s and the write 329MB/s. Similarly, the 4KB test revealed a read score of 301MB/s with a write score of 261MB/s. Clearly, the controllers and chips on both models are very similar in their construction.

> "The bigger capacity will be a great benefit to most users"

The Patriot Ignite therefore performed exactly the same as the Transcend model, booting into Windows 10 in mere seconds to the desktop and running all manner of programs, games and so on. The bigger capacity of 480GB is a plus and allows laptop users or those with limited space to run everything without having worry about running out of space too soon.

The major flaw, though, is the fact that it costs around £170. It's the highest capacity drive we've reviewed so far, and while the performance numbers are good, it does make you wonder if the extra gigabytes are actually worth the expense. After all, you could opt for an equally performing Transcend, Kingston or Samsung model and still have money to spare for a secondary larger spinner.

Despite the cost, though, the Patriot Ignite is a pretty good M.2 SSD. The bigger capacity will be a great benefit to most users, especially those who use video editing and require speedy results, and it's still quicker than most standard SSDs we've used in the past.



It's not the cheapest drive around





The Patriot Ignite is a decent M.2 SSD

Crucial MX200 250GB M.2 SSD

DETAILS
- **Price: £75**
- **Manufacturer: Cruicial**
- **Website: goo.gl/bsSdwz**
- **Requirements: M.2 port, Windows 7 or later**



The Crucial MX200 is a good drive

Our final drive in this group is the Crucial MX200 250GB M.2 SSD. Following the standard SSDs and mSATA drives of the MX200 range, the M.2 version doesn't differ all that much in terms of the specifications, other than the physical dimensions and the final benchmarks.

This is a standard sized M.2 SATA-3 6Gbps device, measuring 22 x 80 x 2.2mm and weighing 7g. The power consumption is 0.2W when idle, 1W average, 3W maximum when reading and 4W maximum when writing. Crucial rates the lifespan of the MX200 at 1.5 million hours.

There's a long list of features that accompany the MX200, inherited from the rest of the product line, no doubt. You'll get Dynamic Write Acceleration, Redundant Array of Independent NAND support, Data Defence, Adaptive Thermal Protection, Power Loss Protection and Active Garbage Collection. On top of that lot, there's also the usual TRIM support, S.M.A.R.T. and error correction.

Most of the technology in those features is much the same as the other models we've reviewed: different abbreviations and names, but essentially all doing the same thing. Again, though, unless you're planning on using several Crucial MX200s in a RAID (or, to be more accurate, RAIN) array, then you'll hardly notice the features at work.



However, it does have the lowest 4KB read test speeds in the test

The ATTO benchmark came back with some intriguing, if a little confusing, numbers. To begin with, the 8192KB transfer test recorded a read speed of 563MB/s (equal to both the Patriot and Transcend M.2 drives), while the write speed proved to be 513MB/s – around the same as the Samsung model.

The 4KB tests, though, didn't fare quite as well. The read speed was recorded at a rather poor 135MB/s and the write speed a mere 106MB/s. We're not sure why the lower transfer rates proved to be a bit of a chore for the MX200, because it's otherwise a perfectly good and decent performing M.2 SSD. Those numbers are the lowest here and could very well end up being a deciding factor for some users.

Nevertheless, we didn't notice any huge difference in the booting of Windows 10 (although it did take perhaps a couple of seconds more to boot from the BIOS) and the running of programs and games. 250GB is a good amount to keep most average users happy for a while, although you'll eventually need to either upgrade or factor in a second, larger capacity drive at some point in the near future.

At around £75, the Crucial MX200 250GB M.2 SSD is pretty good value for money. It's cheaper than the similar capacity models we've looked at here, but considering the poorer small file size transfers, it might be worth considering spending £20 or so more and opting instead for either the Kingston or the Transcend model.

> **“250GB is a good amount to keep most average users happy for a while”**









Transcend MTS400 M.2 SSD

We have to admit, the Transcend MTS400 M.2 SSD represents the best value for money for the capacity, together with performance, lifespan and power consumption.

Certainly there are faster M.2 SSDs available, as we can see from the table below, but overall the MTS400 has everything you could ask for.



Kingston 240GB SSDNow M.2

We think the Kingston 240GB SSDNow M.2 drive was pretty close to the Transcend model, when you take into account the capacity, price, performance, power consumption and lifespan of the product.

How We Tested

Each SSD was installed in an MSI Z170A Gaming M5 motherboard, with two M.2 slots available, an Intel i5-6600K installed, 16GB of memory and the same Windows 10 fresh install image transferred to each M.2 SSD.

We used ATTO for the transfer benchmarks, as well as boot times to Windows 10 after the BIOS had completed and a number of games (*Batman: Arkham Knight*, *Submerged*, *Elite: Dangerous*), along with the MS Office, VLC and a few other programs.

	Samsung 850 EVO	Kingston SSDNow	HyperX Predator	Transcend MTS400	Patriot Ignite	Crucial MX200
Price	£55	£100	£180	£90	£170	£75
Capacity	120GB	240GB	240GB	256GB	480GB	250GB
Dimensions	22 x 80 x 3.8mm	22 x 80 x 3.5mm	22 x 80 x 3.5mm	22 x 42 x 3.5mm	22 x 80 x 3.8mm	22 x 80 x 2.2mm
Avg. Power	2.3W	1.01W	1.4W	1W	1.1W	1W
MTBF	1.5 million hours	1 million hours	1 million hours	1.5 million hours	2 million hours	1.5 million hours
8192KB Read Speeds	550MB/s	554MB/s	1426MB/s	563MB/s	563MB/s	563MB/s
8192KB Write Speeds	517MB/s	533MB/s	916MB/s	328MB/s	329MB/s	513MB/s
4KB Read Speeds	351Mb/s	323MB/s	305MB/s	301MB/s	301MB/s	135MB/s
4KB Write Speeds	302MB/s	251MB/s	290MB/s	260MB/s	261MB/s	106MB/s

Top 5 Controversial Games

We check out a few titles that have hit the headlines for all the wrong reasons

1 Grand Theft Auto: San Andreas

PC games, by their nature, are relatively easy to modify, and generally the mods are high quality and useful. However, for every custom *Skyrim* mission, there's naked a *Lara Croft* mod, so clearly there's an appetite for more naughty content. Of course, developers can't be held responsible for these modifications, but with the Hot Coffee mod for *Grand Theft Auto: San Andreas*, things were different. In this case, the controversial mini-game, which allowed the player to have virtual sex with in-game characters, was actually already there but had been disabled. All the modders did in this case was find it and re-enable it. The Hot Coffee controversy in the US was immense, and *San Andreas* was quickly reclassified with a higher age rating – because games that let you run people over and shoot them are fine, but having sex is just going too far.

2 Mortal Kombat

When *Mortal Kombat* was released in 1992, videogames were still considered to be things for children, like hula hoops and yo-yos. Nobody, apparently, thought it conceivable that they could contain adult content, just like films, and that they should perhaps come with an age rating. When *Mortal Kombat* arrived, then, the moral panic that followed was pretty much inevitable, because the game featured, of course, huge amounts of blood and violence, particularly with its now famous 'Fatalities'. Super Nintendo owners will remember, though, that the blood on that console was replaced with 'sweat' and the finishing moves were all sanitised.

3 Night Trap

Like *Mortal Kombat*, *Night Trap* was one of the games that led to the US bringing in a proper ratings system for videogames, owing to its adult content. In *Night Trap*, a group of young women (who spend most of their time in their pyjamas, it seems) are staying in the house of Mr and Mrs Martin. But this is no ordinary sleepover, because the house is basically a hunting ground for vampires, who enter the premises to feed. The player sets traps to catch them, but failure will see the ladies being attacked and taken away. To be honest, not only is it badly acted, it's not remotely scary, and it's also a terrible game.

4 Call Of Duty: Modern Warfare 2

Remember when the *Call of Duty* games were all about fighting the Nazis in World War II and each level was followed by a memorable anti-war quote? Well, that all went out of the Window by the time *MW2* came along. Infinity Ward instead thought what players needed was to experience the joy of massacring innocent people in an airport using a massive machine gun. The fact that the game warns you before the mission about its 'disturbing content' and allows you to skip it says it all, really. Not the finest moment for the series.

5 Carmageddon

Long before *Grand Theft Auto 3*, if you wanted a 3D game that would allow you to get in a car and flatten pedestrians, then *Carmageddon* would likely have been the title of choice. A game that actually rewarded you with bonus points for running people over, it seemed pretty much designed to annoy censors, and was, not surprisingly, banned in several countries. In many nations, though, including the UK, it was censored, with pedestrians being replaced by zombies or robots. Eventually, though, the original version was released in the UK, so British gamers could indulge their homicidal tendencies as the developer intended. Yay!



▲ *"I'm not sure what's more horrifying – the vampires or your acting"*

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Code With AI2

Timer (Part 1)

David Briddock gets into Google's App Inventor

App Inventor 2 (AI2) is a platform that aims to open up Android app creation to everyone. All you'll need to begin is a Windows, Mac or Linux PC, a web browser and a Google account.

Ideally you'll also have an Android smartphone or tablet, but even this isn't essential to get started.

What We'll Learn

As this will be our first app, we'll explore the Designer View and Blocks View in detail. The lessons we learn here can be applied to all future articles in this series. We won't be starting with the traditional 'Hello World' approach, but instead construct a useful yet simple-to-build timer app. Along the way we'll be add some basic User Interface screen components alongside a clock timer component from the Sensors group.

So; let's get started!

Starting AI2

In your browser navigate to the AI2 home page (**ai2.appinventor.mit.edu**) and sign in with your Google account.

As this is the first time we've used AI2 the project page appears. Here we can create a new project with the Start New Project button and give the it a suitable name, let's say 'MMTimer'.

Next we see the to the main AI2 creation page. You'll notice we're automatically placed into the Designer View mode, which is where app building really starts.

Screen

Look closely at the Viewer and Components panels. Notice there's already a screen component called 'Screen1'. It's into this screen that we'll be dropping the other Timer app components.

Over to the right is the Properties panel for the currently selected component – namely Screen1. In this panel ensure the AppName is set to 'MMTimer', then set the Title to 'MM Timer' and the BackgroundColor to Black. Now for the screen components.

Visual Components

The component Palette panel is over to the left. The individual components are arranged in groups, namely User Interface, Layout, Media and so on. To discover more about a specific block click on the small circled question mark beside each one.

Open the group called User Interface. Drag and drop the Label component over to the Screen1 area in the Viewer panel. The label appears in the top left of the Screen1 area. Also notice that Label1 has appeared underneath Screen1 in the Components panel.

Non-visual Components

We'll also need a clock for our timer. From the Sensor group grab a Clock component then drag and drop it over to the Screen1 area.

Once again we see a Clock1 component has been added underneath Screen1 in the Components panel. This time it's also added to the Non-visible Components area underneath the screen.

Component Properties

First select the Label1 component in the Components panel. Then click the Rename button (it's at the bottom of this panel) and set the name to 'TimerLabel'.

Now let's set some label properties: In the Properties panel change the

BackgroundColor to Black (click on the small square or colour name) and the TextColor to Yellow. Then increase the FontSize to '96.0' and set the Text to '0'. Finally, set both the Height and Width to the 'Fill parent...' option from the popup options list.

Now we shall turn our attention to the clock. The first step is to select Clock1 in the Components panel, click the Rename button and change the name to 'TimerClock'. You'll notice the TimerInterval is already set to 1000ms which, conveniently for us, is equal to one second. So we don't need to change any of the timer property values.

App Code

Now it's time to actually start coding. You'll need to click on the Blocks View button, which is next to the Designer View button on the green menu bar. The first task will be to initialise the second count to zero; so to do this, in the lefthand Blocks panel, open the Variables group then grab a brown 'initialise global variable' block and Drag it into the Viewer panel coding area. As this variable holds our seconds value, you should probably change the variable's text from the default 'name' to 'secs'.

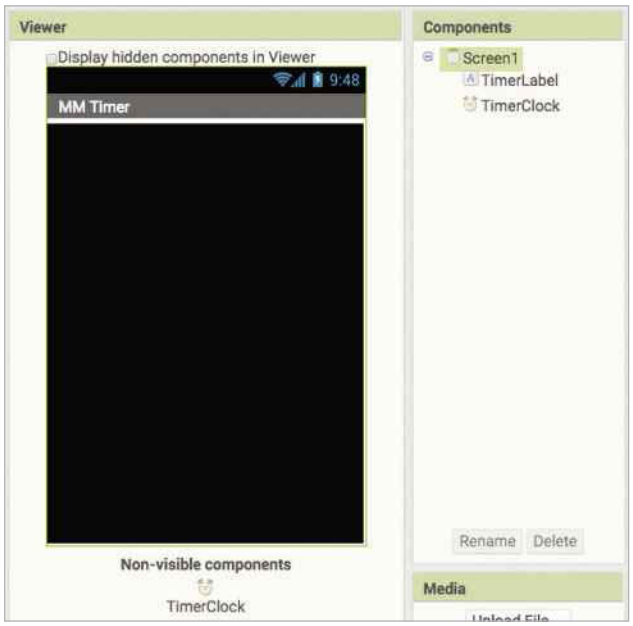
Now to set its value. Grab a blue number value block from the Math group and snap it onto the end of the 'initialise global variable' block. We'll leave the value as zero.

Timer Ticks

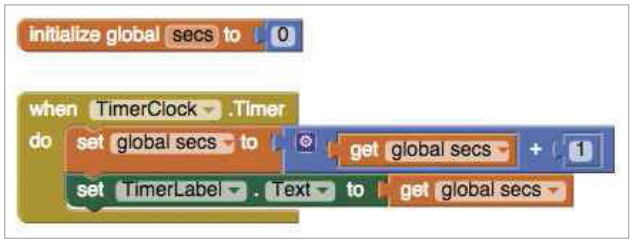
We going to need some code to update the label we've set up when each timer 'tick' event occurs, which we've established happens every second. To do this, look over in the Blocks panel click on the TimerClock component, then grab a brown 'when TimerClock.Timer' block and drop it onto the coding area.

We need to fill in the empty inner space. First grab an orange 'set global secs' block from the Variables group. Snap it into the specially shaped slot inside the brown 'when TimerClock. Timer' block.

To set the value of this orange block we need to do some math. So grab a blue '+' block from the Math group and snap it onto the end of the orange 'set' block. You'll notice that there are two empty spaces; the first space is filled with an orange 'get secs' block from the Variable group, the second is filled with a blue Math number block. Click the default zero value and change it to one to increase 'global secs' by one on every 'tick'.



AI2 Designer View



AI2 Blocks View



MIT App Inventor logo



AI2 Emulator

> **"The emulator takes a while to start up, so be patient; eventually you'll see a virtual Android phone running the timer app"**

Label Update

Finally our label needs to show that total number of seconds. Click on the TimerLabel component, grab a dark green 'set TimerLabel.text' block and snap it just below the orange 'set global secs' block. Fill in the missing value with an orange 'get secs' block from the Variable group.

Now ensure the warning and error counts in the bottom left corner are both zero then carefully check your code against the Blocks View image.

It's all *much* easier than it sounds in words and a fun way to create code.

App Testing

To test our app we'll use the Connect menu's convenient Emulator option. If you haven't done this already, first download MIT's aiStarter app and install it onto your PC (**goo.gl/zPfazK**).

The emulator takes a while to start up, so be patient, but eventually you'll see a virtual Android phone running the timer app you've just created.

What you should see is an incrementing second count displayed on the screen. If you don't, something's wrong and you'll need to carefully check the coding blocks and data values, fixing any mistakes you find along the way. Then use the Connect menu's Reset Connection option before starting the Emulator again.

Going Further

Next time we'll extend this timer app with some useful new components and block code functionality.

We'll also explore a superior app testing method, and discover how to load our apps onto a real Android smartphone or tablet. **mm**

Best of British

A Celebration of Technological Innovation

Mark Oakley glows with pride as he takes a look at some of the developments, hardware, apps and games that showcase Britain's technological prowess

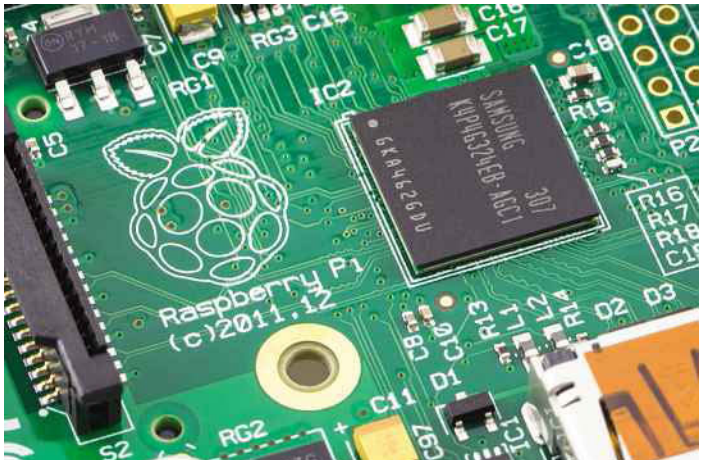
If you could indulge me for just a moment, could I ask you to take a look around your computer workspace. Really take a look at it and think about where all the technology that you use everyday comes from. The chances are that the people who put your computer together, shipped your peripherals, buffed up the glass on your monitor, manufactured the console perched on the end of the table, boxed up your hard drive… well, the chances are that they came from all over the world.

As the globalised economy has grown, so our technology has been increasingly sourced from the Far East and The Americas. Britain, shame though it is, plays a much lesser role in the manufacture of much of our technology that you might wish to believe is the case. Even a quick glance at the free Power Bar charger that EE gave to me as one of its loyal customers features those all-too-familiar words 'Made in China'. It wasn't always like this, though.

Time was when buying in Britain really meant buying British, when Acorns, Sinclairs and Amstrads ruled home computing long before Apple and Microsoft rose to dominate the industry. While it might be tempting to dismiss the concept of British technology as a thing of the past, confined to one of our fine museums dedicated to computing's history, the truth is that technological innovation is alive and well in Britain. In fact, here are some of the success stories that are worth celebrating, alongside some reminders of our past achievements. So stand up, wave your flags in the air, and sing the National Anthem. Yes, this really is the Best of British!

Blowing Rasperries

No article about British innovation would be worth reading without mentioning the Raspberry Pi. The barebones PC from the Raspberry Pi Foundation can be rightly said to be in no small part responsible for the upsurge in recent popular interest in coding in schools.



Zoltan Kiraly / Shutterstock.com

The idea that a whole new generation is getting to know coding via the Raspberry Pi is genuinely exciting and we should all be grateful to the Raspberry Foundation, Farnell Components and everyone else involved for their hard work on this. There are other single-board PCs around, of course, but none have captured the imagination quite like the Raspberry Pi. Indeed, over five million units have now been sold, which is a remarkable achievement for a product that has only been going since 2012.

With a fantastic, intelligent community behind it and a marketing push that has seen such a mighty uptake to date, the Raspberry Pi stands out as one of the real British success stories of the 21st century.

Pulling Your ARM

In the processor industry, Intel and AMD have long dominated. At least, that's the layman's view. There is, of course, a third player in the market that dutifully flies the British flag. I'm writing, of course, about ARM Holdings.

The Cambridgeshire-based semiconductor design company has been around since 1990 and it is chiefly known for its architecture, widely seen in processors with the ARM name, and used within much of the portable technology today's generation is used to using. Most notably, ARM (advanced RISC machine) architecture is under the hood of Apple's iPhones, iPads and iPods, while also being spotted under some Chromebooks and smart TVS. So, a good portion of households in the western world likely has a device that has ARM's fingerprints somewhere on it. ARM's range of processors accounts for over a quarter of all electronic products shipped around the world today, according to its website, with 15 billion classic ARM chips having been shipped to date. Now that's a success story.

What's perhaps most interesting about ARM's operation, though, is that it actually licenses its technology to other companies, including Apple, Samsung, and Qualcomm. This innovative approach to business has helped ARM to become ubiquitous in the mobile devices industry, despite the fact that its brand name remains very much under the radar.

To help it achieve the scale of distribution it does, ARM has offices around the world and it deserves recognition as one of Britain's very greatest success stories.

Think Big

Widening our gaze for a moment, I wanted to focus on some of the very greatest innovations currently dominating the world outside of IT. For example, 3D printing has become hugely important in the field of medicine with the US recently approving a 3D-printed pill proving to be the latest in a long line of possible applications. Organ printing is a key one, of course, with organs printed from a patient's own cells very much part of the scientific and medical conversation right now.

Scotland's Heriot-Watt University has played a key role in the development of 3D printing, within the field of organ replacement in particular. Over the past few years, researchers from Edinburgh have come up with a technique for the production of stem cell clusters to speed up the artificial organ production process. So, as 3D printing could very well be one of the single most important scientific innovations of the 21st century, it's great to know that the Brits are at the forefront of some of its potential applications.

Plastic electronics is the process of printing electronics directly onto substrates, potentially ripping up the rulebook by allowing smartphones and tablets with bendy screens or placing electronics onto packaging. The process could also see components printed directly onto surfaces, rather than onto a circuit board. The result is lower costs and Cambridge University was the home of the genesis of this technology with researchers at its Cavandish

Sinclair, Amstrad And The Glorious 80s

It is 30 years this year since the Commodore Amiga was launched. Yes, yes, I know Commodore was a North American company, but this is a significant point as it's fair to say that the Amiga ushered in an age of computing that was to lay the grounding for the multimedia systems we know and love today.

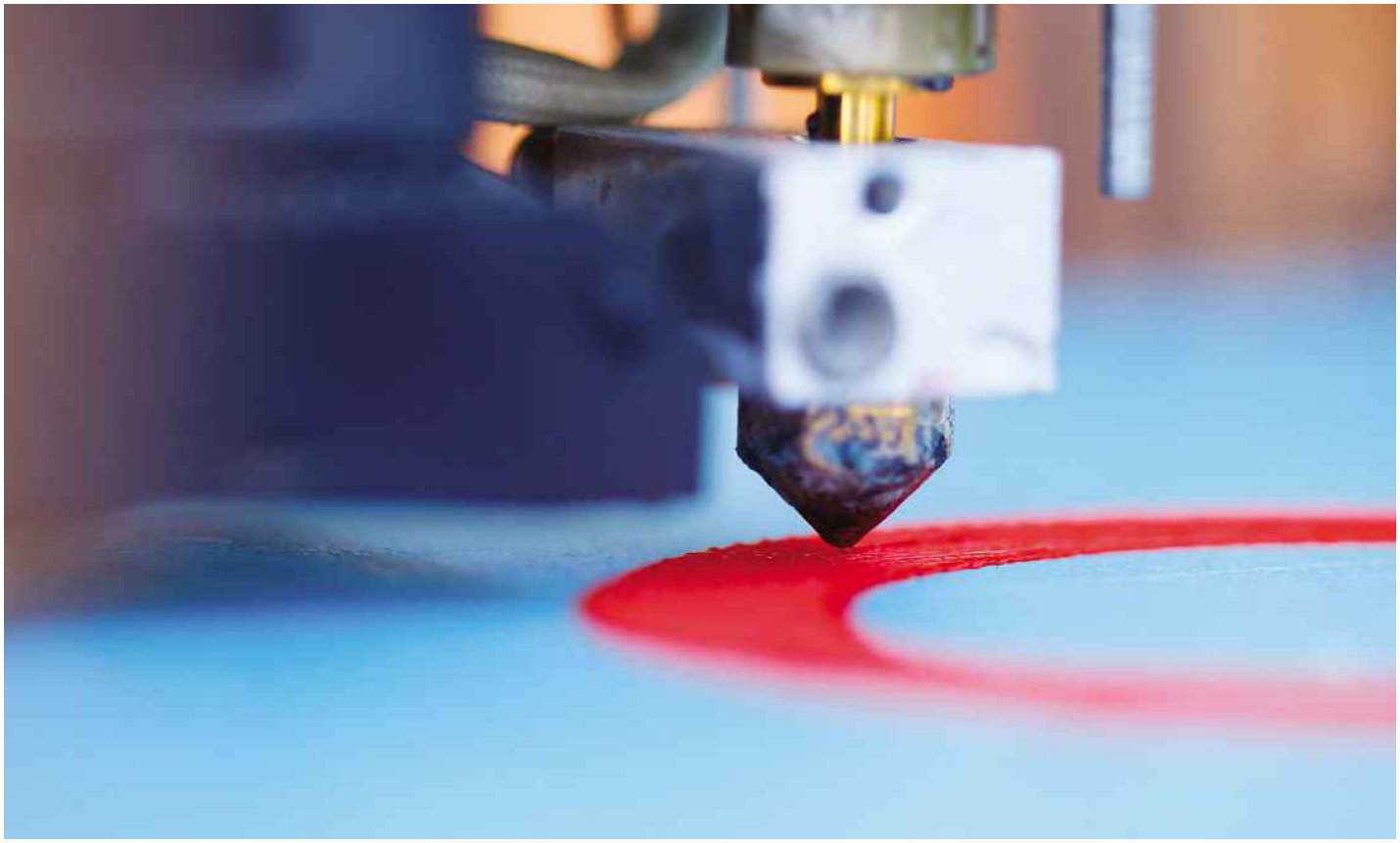
It's also arguable that it trounced what came before it for British consumers, namely systems coming out of Sinclair and Amstrad. In many respects, the massive advancement in processing power and graphical capabilities that Commodore's system brought to the world ushered in a whole new era for gaming enthusiasts such as myself. Everything that had been previously introduced by our two major electronics companies was surpassed, and then some, by this gaming god.

That's quite enough of that, though. Yes, Commodore's Amiga was great and, certainly for writers of a certain age this, a watershed in terms of gaming technology. For those of us wanting to partake in a bit of coding in between games of *Match Day II*, however, Sinclair and Amstrad remain pivotal players in gaming's history.

The 80s was a truly innovative time for the British computer industry. 1982 saw the release of the ZX Spectrum, the UK's best-selling computer at the time and a serious contender for the most important system to ever come of out Britain. Viewed fondly as one of the forefathers of the UK computing industry, the system has even been given fresh life (kind of) by a couple of modern interpretations. Personally, I was a Spectrum man, but the UK computing history would have been far poorer without the competition put forward by Amstrad.

The CPC range fared well during the battle for our cash in the 80s and following the company's purchase of Sinclair, the resulting ZX Spectrum +2 would also prove a winner, famous for having a tape recorder attached to it. This might seem ridiculous now, but at the time these were forward-thinking ideas that helped to make our industry so revered around the globe.

Today, Apple and Microsoft dominate the industry and it's difficult for younger audiences to imagine such a keenly-fought battle between two such British-based major players. Truth be told, we may never see a time quite like that again.



Laboratory pioneering work into finding out more about how this could be utilised on a practical level. As the University's website states, interactive playing cards and artificial skin are just two of potentially many uses of this technology, which could also lead to cheaper and easier-to-manufacture products.

In Bristol, OC Robotics is working on its LaserSnake project, which essentially moves a robotic arm connected to a laser cutting tool designed to work in tight spaces. The project received a £6m government grant in 2013, which backs up the UK government's view that it is actively encouraging innovation in the country.

More recently, the increased adoption of Bitcoin has been well-received by the British government. It has, along with the Bank of England, supported the view that the digital currency has its place in the economy and will look into regulation in that respect. With the likes of Barclays reported as being among institutions interested in adopting bitcoin technology going forward, this is another example of forward-thinking among us Brits.

Systems, They're Doing It For Themselves

An area of rich rewards for the British computing industry in recent years has undoubtedly been the system builder market. Consumers keen to specify and customise their own systems rather than opt for ready-made boxes from Microsoft, Dell and such have a myriad of options at their disposal and that's down to some of Britain's fantastic custom builders.

One of the most well-known is arguably Chillblast, an award-winning builder of custom PCs, no less. Chillblast is based out of Poole and it can proudly boast a batch of awards from the UK computer press for its work in building and testing a custom-built PC for its customers. From home office desktops to gaming rigs, Chillblast is one among our many proud PC building companies that is flying the flag for the humble PC. The PC market may be in decline, but it's arguable that system builders hold the key to any sort of future.

BBC Micro: Bringing Coding Into Schools

Among the BBC's many great innovative achievements in technology, the BBC Micro has arguably had the greatest, most widespread impact.

Designed by Acorn Computers for the BBC Computer Literacy Project, the idea was to give people a grounding in computers via a ten-part series that was to be accompanied by the availability of the BBC Micro itself. Allowing viewers to join in with the programme and try out what the presenters were doing on screen, this was genuinely ground-breaking stuff.

The BBC Micro itself became frighteningly popular in schools with a huge proportion of them owning one during the decade, helped out in funding by government subsidies. Teaching a whole generation about computer literacy and coding, the BBC Micro retains so many fond memories for swathes of adults all over the UK. For many of us, this was our first introduction to computing, and it was all possible because of some smart chaps over at the BBC.

Chillblast isn't alone in being worthy of praise, of course. There's also the likes of Yorkshire's CCL, Newcastle-Under-Lyme's Overclockers, Wakefield's PC Specialist and London's Mesh Computers. While system building isn't the sole preserve of the Brits, it is worth noting that we do have something of a habit of going about our building business. Many of these companies have been around for decades and it's pleasing to note that, in a world of next-generation consoles, high-end smartphones and touchscreen devices galore, custom-building of PCs for customers who know what they want is still holding it own.



chrisdorney / Shutterstock.com

Auntie Beeb

There can be little doubt in my mind that the BBC is responsible for some of the very worst atrocities that my eyes have ever been privy to. Ben Elton's sitcom *The Wright Way*, *Snog Marry Avoid*, and *Hole In The Wall* are just a few of the many truly awful shows the corporation has been responsible for.

Conversely, the BBC remains a champion of innovation, not least with the development of the iPlayer. The launch of the iPlayer in 2007 ushered in widespread adoption of catch-up television and radio services and I've long been a champion of the service.

Since those early days, the BBC has ensured that the iPlayer's development has never stood still, not least by rolling out an excellent, associated range of mobile apps – and most recently providing the Radio iPlayer service with an all-encompassing 30-day Listen Again service for any and every show broadcast across the BBC's range of audio programming. When people talk about the BBC in terms of whether it offers value-for-money, there is no doubt in my mind that the corporation's digital services are more than enough justification for its existence (and, in truth, I'm rather fond of much of Auntie Beeb's programming, particularly the excellent music documentaries you find on BBC Four).

"The Micro Bit project has brought the BBC's innovative approach to technology full circle"

Away from its crowning glory of the iPlayer, the BBC has also recently reintroduced the BBC Micro project in the form of the BBC Micro Bit pocket computer. In another ground-breaking educational project that will see the computer handed out to a million school kids across the UK, the Micro Bit project has brought the BBC's innovative approach to technology full circle (see the boxout on the original BBC Micro project elsewhere on these pages). Together with its Bitesize educational learning resources, its educational apps for kids, and its ever-evolving website, the institution is one we should all be proud of.

So, the BBC then. On the one hand, a genuine driver of technological innovation within broadcasting and education for generations. On the other hand, the broadcaster of *Danny Dyer: I Believe In UFOs*. Figure that one out – and feel free to get in touch if you do.

Innovate UK

Did you know that the government actually runs its own innovation agency? Innovate UK "works with people, companies and partner organisations to find and drive the science and technology innovations that will grow the UK economy."

The agency is essentially responsible for deciding on what science and tech projects, aimed at developing future economic growth, deserve funding. It also helps to connect innovators with partners to make a success of things.

Since 2007, the agency has invested over £1.5bn in innovation, helping over 5,000 innovative companies in projects that have been estimated to add £7.5bn to the UK economy – creating 35,000 new jobs.

Lovely.

Paying Around: Apps and Games

The recently-opened National Video Game Arcade in Nottingham – which stakes a claim for deserving a mention in this article too for its highly innovative exhibits showing that gaming isn't confined to a joypad – has shone a light on the influence that British developers have had on our gaming past.

On a personal level, The Bitmap Brothers and Sensible Software had a deeply profound impact on my own life. The words 'cult classic' pretty much define everything that The Bitmap Brothers was about, with a punky sensibility and an attitude towards game design that made the studio stand out from the rest. *Speedball*, *Xenon*, *The Chaos Engine*; all are genuine classics of their respective genres and stand out in my mind as genuine gaming greats. The thing that made The Bitmap Brothers unique among developers was that this was super-stylish, edgy design, purposely intended to stand out and shake the gaming industry up. There have been many articles written on how this was the punk-rock of game design, and this approach helped to put The Bitmap Brothers front and centre of the UK gaming industry at the time.

The Bitmap Brothers were also famous at the time for handling their own distribution via Renegade Software, which was additionally responsible for distributing other company's games, including Sensible Software's *Sensible Soccer*, and the outstanding follow-up *Sensible World of Soccer*, both of which remain notable reference points for football titles and had a graphics style that Sensible mirrored in the likes of *Cannon Fodder* and *Mega-Lo-Mania*. All are classics, but it's *Sensible Soccer* that remains influential today.

For modern gamers, Rockstar and Rocksteady are arguably the biggest innovators in the gaming industry. Rockstar North is the Edinburgh-based subsidiary of the multi-national game developer and it was this company – then known as DMA Design – that was responsible for *Lemmings* and the original *Grand Theft Auto* games. Of course, we all know how successful both those franchises turned out to be. With *Grand Theft Auto* in particular, Rockstar could have a claim on having helped to bring the modern levels of violence to video games with the original game pilloried in the British press. In 2013, its latest in the franchise – *Grand Theft Auto V* – became one of the biggest-selling games of all time, as well as one of the best critically-received.

As for London-based Rocksteady, its *Arkham* series of Batman titles has arguably become the finest trilogy of superhero games ever, altering the received wisdom that superheroes and film characters simply don't make for good videogames. While latest release *Arkham Knight* has been criticised for the shoddy standard of its bug-riddled PC release, the console version has gone on to do fantastic business once again.

First Steps

We simply had to mention the world's first digital electronic computer. The Colossus, which you can see for yourself at The National Museum of Computing of course, was created in the 1940s and was probably most famous for helping to crack German ciphers during the Second World War.

Beyond that, how about the theory of the Universal machine put forward by Alan Turing? The theoretical basis for everything we now know as computing was put on paper by Turing with his system of a device that would be capable of reading symbols on a tape, with the tape then powering the machine. Little surprise that this won the 2013 vote for the Greatest British Innovation poll.

We Brits have a bit of a history at this sort of thing, you know?



Rocksteady's 'Arkham' series of Batman games has proven immensely popular





The latest edition in the Broken Sword franchise was part-funded by a Kickstarter campaign

Nowadays, of course, mobile gaming is the same big business as PCs and consoles have long been. However, because of the nature of mobile gaming, innovation is often more important if you want to entice gamers to part with their money. One of the most innovative games in recent years was *The Room*, an outstanding first-person puzzler that was developed by Guildford's Fireproof Studios. The Room deservedly went on to win a BAFTA for Best British Game.

Revolution Software is housed in York is is responsible for the *Broken Sword* franchise of apps. 25-years-young, Revolution Software has cited Apple for saving its bacon and it's even used Kickstarter to help fund its recent fifth iteration of the classic adventure game. There are countless further examples of Brits pushing the envelope in mobile gaming, not least Inkle's award-winning romp *80 Days* and ustwo's global success *Monument Valley*. Both are fine recent examples of how British innovation has made mobile gaming a better place to be.

Outside of games, the British also have their fingerprints all over some of the world's most innovative and successful apps, too. Yahoo News Digest started out life as Summly an app invented by an English teenager and computer programmer called Nick D'Aloisio back in 2011. With Yahoo acquiring his company in 2014, D'Aloisio is said to be worth millions but, ignoring the figures for a moment, he's living proof that with a healthy dose of innovative thinking (and a spot of luck) great things can be achieved in the mobile industry.

Things like Blippar and its use of augmented reality to bring adverts to life and give companies a fresh platform via which they can engage with consumers. Nosy Crow is another notable company doing interesting things within the mobile space, with the children's publisher putting together books that use an iPad's features to help bring the stories to life, while making sure that the stories remain front and centre. The illustrations are astounding and it's great to see apps for kids that parents can enjoy too.

These are just a few examples of UK companies proving their worth in the mobile industry – P2 Games is another publisher that's worth looking up – and, like the other companies mentioned here, they all form part of a rich UK industry dedicated to technological innovation that has, in many cases, impacted on the entire world. **mm**

Jonathan Ive: Mr Innovation

Perhaps no British man or woman has had as much impact on modern technology as Jonathan Ive. His work as Apple's head of Industrial Design, most recently leading to his title as Chief Design Officer, has even bagged him a knighthood in recognition for his "services to design and enterprise".

Ive's work at Apple has seen the creation of some of the most iconic technological designs in modern times, with videos of Ive himself having been steadily put front and centre of new Apple releases. Put to work on the iMac as one of his first design projects, the resulting iMac G3 model remains as startling a redesign now as it surely was then. His work with the company helped to bring design to the forefront of Apple's product launches and this in itself was an innovative rethink on how to approach product releases at the time.

The iPod and its clickwheel would perhaps be Ive's greatest, most-recognised achievement. To this day, THAT clickwheel stands out as a truly unique approach to navigation on an MP3 player, and back when it first came out it was head and shoulders above any other MP3 player navigation on the market. Most players were clunky, chunky affairs. The iPod was slim, slick and had this navigation system to die for. The early iPods paved the way for the designs that would come after it, slimmer touchscreen models that would eventually lead to the modern-day iPhone. The impact of the iPod on both the hardware and digital music industry cannot be understated. So ubiquitous are iPods, iPhones and, of course, iPads, nowadays that millions and millions of households around the world have Jonathan Ive's design imprint all over them.



Ive and his close-knit team have helped to shape the digital world we live in. Think what you like about Apple and its products, but there is no denying that Ive deserves his place in any innovation hall of fame.

Choosing A Monitor





What The Jargon Means

If you're a desktop PC user, you'll have some form of monitor connected to your system. Laptops, all-in-ones and tablets have no such concern, as they all have their own built-in displays, but the more traditional PC is not so lucky and needs to be accompanied by the ever present monitor.

These have changed greatly over the years, embracing new technology and offering increasingly better image quality, but one thing has remained the same: the confusion many face when it comes to buying a new one.

Most are familiar with the basics of buying a monitor, such as the size, resolution and things like 1080p or 3D. The problem here is the undercurrent of technological terms and important specifications that aren't as apparent and not freely as discussed by sales reps in shops. Too often people simply rely on the help of others when making a purchase or base their decisions solely on a big name manufacturer or screen size, and this is often not the best way to go about picking your next display. There's a lot more to it and, depending on your uses, the type of monitor you'll want to buy and the cost that comes with it can often vary.

Looking for a new monitor but aren't sure what all the technical information means? Let us fill you in

With this in mind, we thought we'd have a look at this monitor jargon and try to demystify the most important elements of it, as well as looking at the best kinds of purchase for different PC users.



Old Vs New

Before the LCD revolution that led to almost all PC monitors being flat screens, the clunky and heavy CRT monitor ruled the roost. This older tech, which basically came from standard TVs, used a cathode ray tube (CRT) to project the image, and it was limited in terms of maximum resolution, visual fidelity and overall performance. Oh, and did we mention they were big?

Today these models are all but extinct, and unless you hunt around specialist retailers or auctions, you'll only see modern flatscreen models. This is good, as the latter are much better in terms of quality and energy efficiency, but there are still some uses for the old tech.

Older PC users and gamers often find themselves missing CRT displays. Just like many audiophiles prefer the sound of vinyl records over CDs, some PC users prefer CRT screens, and some older software and games look and function better on these models, especially software that runs at lower resolutions. Many users still keep an old CRT around for such purposes, and they're great if you



Older CRT monitors are bulky, but many still prefer them

need to work with older video footage or just hanker for the good old days. For most, however, CRTs are long gone, and we've moved on for good reason.

Technical Tour

Buying a monitor seems like a simple task, but as we've already said, it's far from simple if you really want to make a good purchasing decision. A good deal of this complexity comes from the technical jargon that covers a monitor's specifications. To many, these different details are nothing more than gibberish and understandably so, but getting to grips with this information can be a major help, so let us guide you.

We'll cover some of the most important details you need to look for when buying a monitor, including some of the core specifications, beginning with the resolution.

Resolution

The resolution of a monitor isn't the be all and end all of a display, and for many users, as long as a monitor offers at least 1280 x 1024 resolution, there's little to worry about. Often, monitors will come with all sorts of higher-resolution possibilities, such as the new 4K models, but unless you're a serious gamer, major movie buff or a power user such as an artist, you're really not going to need such a high resolution. If it won't affect your price too much, go for it, but if the higher resolution adds considerably more to the outlay (which it almost always will), it may be best to reel in that resolution until the price drops and the technology is more widely used.

All monitors have a native resolution, which they're built to support for optimal viewing. This is determined by the number of pixels across and down the screen of that particular model (this is also how a resolution is worked out, of course). By setting a monitor's display lower than its native resolution, the graphics card of your PC will have to rescale the image, fitting a smaller output onto a larger screen. This often results in a blurry, far less clear image. Likewise, if you try to force a larger resolution, the graphics card will attempt to scale an image up, which can also cause problems, if it's even possible.

It's also important to know that graphics cards have limits and likewise support limited resolutions. If you have an older card and are thinking of buying a new monitor, be sure your current graphics card is capable of handling the new monitor's resolution. This may require an upgrade, but some card may be able to support higher resolutions with new drivers.

Refresh Rate

Measured in Hz, the refresh rate of a monitor represents the speed at which a display buffer can be refreshed and how quickly identical frames are reproduced. It was once a more important feature with CRT models, as lower refresh rates would cause a lot of screen flickering and strobing, leading to vision problems and headaches.

Refresh rates are still present with more up-to-date screens and dictate the number of times per second the display draws the data sent to it. There's rarely any flickering, but higher refresh rates can cause artefacts to appear without added enhancements to smooth things out. Additional processing is usually used to correct this, which can cost a lot more.

A general rule for this specification is to go for a faster, higher refresh rate, but this is also tied to our next specification: response time.

Response Time

This is a very important specification if you're planning to use your monitor for games, movies or intricate tasks like image work or video

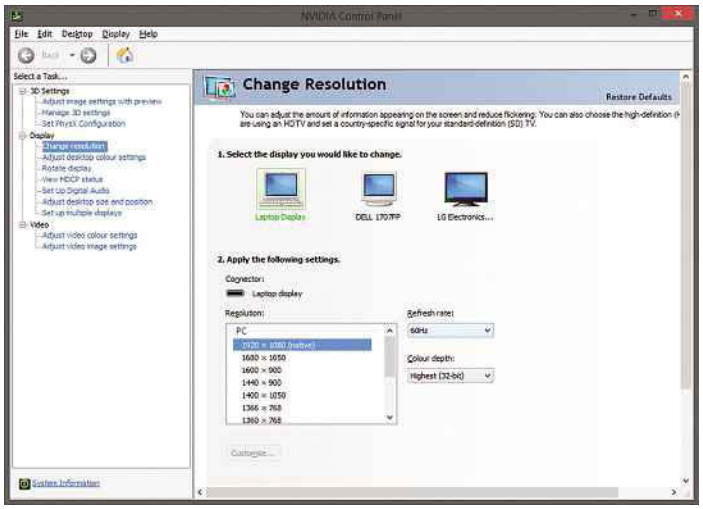
> **"The resolution of a monitor isn't the be all and end all of a display"**

editing, and it's also very simple. The response time of a monitor measures how fast a display can update its images. The faster the response time, the smoother the image. Slower response times often result in blurry images and other distortions. This is most noticeable with fast-moving images, such as games or sports, and could also cause problems during fine detail work.

Clearly, you'll always want a lower response time, ideally below 5ms. This will deliver the most fluid image, and even if you don't use a monitor for tasks that demand it, it's best to go for the faster response.

Contrast Ratio

A monitor's contrast ratio is the ratio between the brightest white to the darkest black a monitor can produce. The higher the ratio, the bigger the range between the two extremes, which in turn means a



All graphics card driver packages have various settings, including options to change the refresh rate



A simple illustration of how response time can affect an image, as used by monitor manufacturer, BenQ

better quality and range of whites and blacks. Simply put, you'll get a richer, more detailed image.

This is a specification that's often emblazoned on boxes and sale signs, mainly as it often includes ridiculous numbers that draw people's attention, such as 1,000,000:1. Clearly the more zeros you stick on a number, the more attractive it is to a paying customer, because it's better. Or is it?

In truth, this isn't always the case. While a higher number is technically better, and a higher ratio can produce a better image, it's arguably not actually that accurate, and many high ratios are more of a sales bluff than a real measurement.

There are also two different kinds of contrast ratio: native and dynamic. Native is a measurement of what the actual hardware is capable of producing on its own and the range it can reproduce. A dynamic ratio is a different technique that adjusts the range of a display on the fly, altering the highs and lows of the screen to accommodate different images and levels of black and white.

Although it's often debated, it's usually perfectly fine to stick with a contrast ratio of around 1000-3000:1. Mammoth 1,000,000:1 options don't really offer true results, so aren't really worth paying for. As with many of these specs, though, if the extra cost is low or non existent, go for the better option.

Dot/Pixel Pitch

This is the measurement between a screen's pixels, triads or LED clusters, depending on the tech used. The shorter the distance is, the more can be fitted onto a display, meaning the monitor can handle higher resolutions, thus providing a crisper, more detailed image. There is a downside, however.

Take LED screens. The distance between LED clusters dictates how many clusters are contained on a screen. The more clusters, the higher the resolution, and the better the image. More clusters also means more power is needed to power the display, and it often means the monitor itself will cost more to buy. High dot pitches can also mean OSD menus are smaller. It's a balancing act in terms of cost, but if you're looking for high-end monitors, you'll probably care more about a crisp image, so go for the better rating.

Gamut

The gamut rating of a monitor dictates the range of colours that can be displayed. More colours will always make for a better display, so it's important to pick a monitor that features a high or large gamut.

Luminance

Measured in candles (cdm2), the luminance of a monitor is simply the measurement of the unit's maximum brightness. The higher the luminance, the more intense the brightness. This is a double-edged sword, though, as a higher brightness is often great for multimedia use, such as gaming and movies, but if you're using your PC for a lost of writing or web browsing, the brightness can be harmful to the eyes after prolonged use. It can also affect your ability to determine colours, whites and blacks if you're using an image editor. Of course, you can adjust the brightness, so it's not a major problem, and having the ability to utilise a higher brightness makes for a more flexible display.

Aspect Ratio

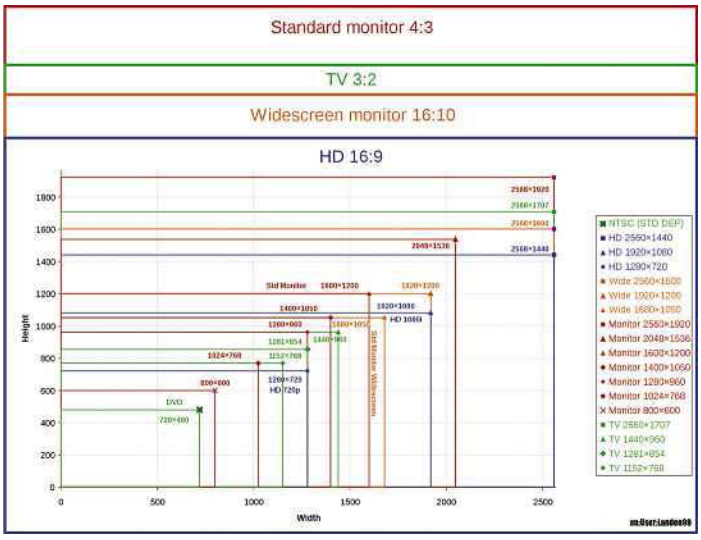
You're probably familiar with the term 4:3 and 16:9. These are aspect ratios, and they describe the proportion of the display panel and its physical size and dimensions. The two figures stand for the width and height of the screen and also signify the orientation of a unit.

4:3, for example, is the classic almost square, full-screen, standard-definition (SD) display, while 16:9 is the most popular widescreen, high-definition aspect, with a much more elongated width to accommodate a wider image. There are many different aspect ratios. 4:3 and 16:9 are the most common, but 16:10 and 21:9 are also widely used.

The majority of displays these days utilise widescreen ratios, but you can still buy 4:3 models if the older style suits your needs best.

Viewing Angle

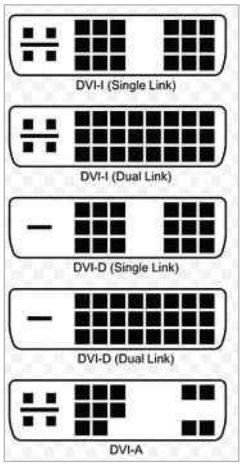
The viewing angle of a monitor is the range in which the display of a monitor remains visible, clear and watchable from an angle. If you



The various aspect ratios and resolutions for comparison



▲ *This is a simple, rough approximation of how contrast ratios affect black and whites, with the higher ratio on the right*



▲ *Some different types of DVI connector*

move your head to the side of a monitor and look at it from an angle, the image will often wash out or distort on displays with a smaller viewing angle. The wider the angle, the less likely you'll notice this when viewing a display from anywhere but straight on. It makes screens much more flexible in terms of positioning, and if you're using multiple monitors and likely need to angle them, you'll be less likely to run into image distortion problems with better viewing angles.

OSD

On-screen display – nothing amazing here, just the abbreviation for the monitor's menu system. It's worth checking out before you buy, however, as these menus often reveal some of the monitor's more useful capabilities, with features you may otherwise go unaware of. Some OSD systems are designed better than others too, while some are sluggish and unresponsive.

Screen Size

The big one, and the specification most people first look for when buying a new monitor or TV. The screen size is, of course, the size of the actual screen, and it's worked out by measuring the actual visible screen diagonally from one corner to the other, not including the surround.

The size of a monitor can be misleading at times, as widescreen monitors may appear to be smaller on paper than non-widescreen models, but this difference doesn't matter due to the focus on the screen's width, not height.

Screen Type

We've already mentioned the older screen type of CRT. Flat panel screens are more complex, though, and come in several different forms. LCD (liquid crystal display) is probably the most popular form of flat-screen monitor, and such models are lightweight and affordable options that produce a very good display quality. They also use relatively little power. LCD displays are now usually based on a cross between LCD and TFT technology.

TFT (thin film transistor) is a different type of LCD display that comes in a number of guises. TFT isn't usually used as a sales term. Instead monitors are usually simply labelled as LCD.

Types of TFT include IPS (in plane switching), which are considered to be the best all-round LCD displays; TN (twisted nematic), which are TFT screens usually found in laptops and are known for lesser colour gamut performance; and finally, there's PVA (patterned vertical alignment). Better than TN models, with a superior colour gamut, PVA screens are a mid-range tech with good performance but often have limited viewing angles.

LED

The most recent and, some would argue, best form of digital display. LED screens don't use pixels or crystal layers. Instead they make use of low-power LED clusters to produce the image. The result is a display that looks great, has fast response times and uses very low power. They're also usually lighter, thinner and produce less heat.

Plasma

Although plasma is a television technology, not really applied to the PC market, there are still many people who use plasma displays as a monitor. This is usually because some users consider plasma screens superior in terms of colour and response time, but they also have the downside of potential image retention (aka screen burn-in). This can be permanent or temporary, but it's a definite concern as plasma sets are often very expensive.

Because PC monitors often display the same image for prolonged times (GUI toolbars and so on), plasma screens aren't really recommended for PC use. If you do choose to do so, ensure you have a screensaver set up. Plasma screens have been all but dominated by LCD and LED in today's market, mainly due to the much higher cost of plasma compared to LCD.

Connections

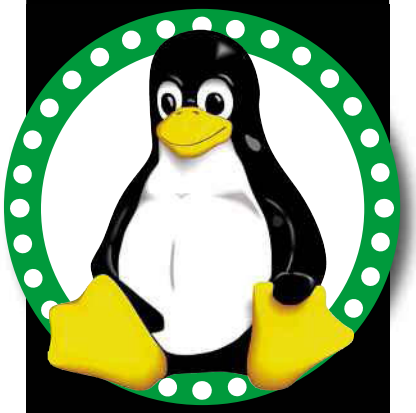
Most monitors come with a range of connection types, and it's important to note these so you can be sure your new display will be suitable for your needs.

Most monitors will come with the basics, including a standard VGA connection, as well as DVI. Almost all now come with HDMI too, which is quickly becoming the most popular form of connection. Unlike VGA and DVI, HDMI is able to carry both video and audio, so it makes the most of monitors with built-in speakers.

DisplayPort connections are a relatively lesser-used connection type. It's a digital connection that also includes a USB feed. Although it's actually more recent than the older DVI, the latter connection is still more popular.

Returning to DVI, it's also important to know the different types of DVI, because there's more than one. There's DVI-A, DVI-D and DVI-D Dual Link. These each come with a different connector type, so be sure your chosen monitor supports the kind you need to use.

And that's it – the most common and important technical details you'll come across when looking for a new monitor. With this information, you should be able to ensure you get a better quality screen and don't make a purchase based solely on looks and screen size. Happy hunting! **mm**



More Wine, Please

A new Wine dev release

Alexandre Julliard of WineHQ has recently announced the latest development release of Wine, which has reached version 1.7.49. With it came a number of potential fixes and improvements that could prove extremely useful to those who rely on Wine for running Windows-based programs on their Linux PCs.

The new additions to the release include better DirectWrite for rendering text in Steam, some Direct2D improvements, more OpenMP functionality, and support for namespaces in the IDL compiler.

Further to these new additions are a number of bug fixes that will certainly make life a little easier for its users. Included among the many are:

- Microsoft OneNote 2007 'Insert Audio Recording' doesn't work.
- *Mig Alley Flight Simulator* (1999) crashes due to unimplemented msvcirt.dll.
- *Among The Sleep* crashes when starting a new game.
- Multiple games crashes with unimplemented function x3daudio1_7.dll. X3DAudioInitialize.
- 64-bit Lexmark X2670 All-in-One printer driver installation fails.
- Steam crashes shortly
- after login when DirectWrite is enabled.
- Windows Sysinternals Process Explorer and other tools show zero thread start address.

In all, and through the previous bug fix releases, the WineHQ team has recorded an impressive 32,350 closed bugs since they started monitoring events through the World Wine News. Issue one of WWN, by the way, appeared on 20th June 1999 – interestingly back when it refers to Wine as a Windows/U*Nix Emulator.

This now leaves 6339 bugs left open, which the team hope to rectify over the coming months. Naturally there's also going to be additional bugs added as time goes on, but on the whole the Wine HQ scene feels like it's beginning to get on top of things. At least until we start to see DirectX12 programs and games starting to appear.

> **"The WineHQ team has recorded an impressive 32,350 closed bugs"**

On Another Note...

It's interesting that, while I was writing this up, a friend asked why Linux users use Wine? My answer, obviously, was that we use it to run Windows programs and games within the Linux current environment without having to resort to a virtual machine.

Her response to this was simple enough: "if they're playing Windows games, using a Windows client such as GoG or Steam, then why don't they save themselves the trouble of limited frames, glitches, and all that work to get it running under Linux, and simply install Windows on a separate hard drive or hotswap, or as dual boot?"

It's a good question, and there are many different answers that we could offer. But we thought it would be infinitely more interesting to hand it over to you and see what your answers to that particular question would be.

Write in and let us know.

Apparently, Wine is good for you again... Thank heaven's



David Hayward has been using Linux since Red Hat 2.0 in schools, businesses and at home, which either makes him very knowledgeable or a glutton for extreme punishment

X out of 10

Windows has leapfrogged nine and gone all the way to ten, but is still missing a trick that Apple sussed years ago

At the time of writing, Windows 10 has just dropped and the verdict from those who've tried it appears to be broadly positive. At the very least, it washes away most of the taste of sheer evil that Windows 8 had left in everyone's mouths. It's a smart, modern take on Windows, even if it worryingly underpins the theory that Microsoft gets it right precisely every other major update. Hold your breath next time around, then.

However, one thing Microsoft hasn't handled terribly well is the update process itself. In order to push adoption of its latest OS, Microsoft has made it free, which is a very good thing for most people. But a quick search online showcases the confusion that's now spread across the internet like a particularly nasty virus. Is the update really free? How long will it be free for? How do you get the update? Is it possible to use your copy of Windows 10 on a different PC to the one you update on? Are there activation keys? Which version should I run? Even some tech-savvy users are sitting waiting for an Exciting Upgrade Button™, which Microsoft helpfully says should arrive any day now; or possibly within a few weeks... Who knows?

It's a stark contrast to how OS X works: download it from the Mac App Store. That's it. If you've a Mac that's supported, you can download a copy of the latest OS X. There are no versions. There are no product keys. There is no activation. There is no freebie window. You just download, install and away you go.

In a sense, these two install processes mirror associations with the companies that created them. Microsoft, even when it means well, has a tendency towards bloat and complexity that it can never quite free itself from. Apple, for the most part, advocates elegance and simplicity. But before Apple fans roar about how 'their' platform is the OS that deserves 10/10 (or X/X), Apple's processes also showcase other aspects of how the company works – ones that aren't so positive.

A good example is that the OS X upgrade is a 'latest or nothing' deal. If you're running OS X 10.8 and would quite fancy upgrading to OS X 10.9, tough – it's no longer an option. Now, it's Yosemite or bust. Given the massive bugs buzzing around Apple's latest OS, you'd perhaps be smart to upgrade to the previous major release, but Apple won't let you. Additionally, the only route to a major OS X upgrade is through the Mac App Store, which is fine when the Mac App Store is working, which isn't always. Having a single place to access all of your software is great right up until the point that place isn't available. Then you're looking at a walled garden, wishing you had a sledgehammer.

Perhaps, then, Apple and Microsoft could learn a little bit from each other when it comes to their 'perfect tens'. Microsoft could finally shake off years of corporate thinking and attempt to streamline everything until there's no more streamlining to be done. Make the Windows upgrade process simple to the point it can be explained in a single line of text, and it cannot be simplified any further.

On the other side of the equation, Apple could be less rigid in the way it has people upgrade, providing wider means of accessing its software, and the option of installing older versions of OS X if a user wants to. Both are likely wishful thinking, though, and unlikely to happen when each company inevitably finally turns up its operating system to eleven.



‹ OS X only gives you the option to update to the latest version.

Craig Grannell is a writer, designer, occasional musician and permanent loudmouth. He's owned Macs since 1996, when Apple was facing certain doom, and is therefore pleasantly surprised by its current success. Find **Craig** on Twitter at **@craiggrannell**



A Window Opens, Another Closes

Ian McGurren finds Microsoft at a crossroads

Ian is a professional IT analyst, a semi-professional writer and a pretty amateur electronic musician. He likes gadgetry and loves making gadgets do things they were never designed to do

Mobile

It's fair to say that, of most of the major technology companies in the past few years, Microsoft has been the most up and down of them all.

Down: off the back of the huge success of the Xbox 360, it makes a fudge of the launch of the Xbox One with DRM methods that were consumer-unfriendly, to say the least.

Up: while the phone operating systems of the Windows Mobile era had been looking increasingly out of place in the Android and iOS world, the launch of Window Phone 7 and 8 showed the company could still do good stuff, with the OS warmly received by the tech community.

Down: along with the Xbox 360, Microsoft enjoyed a purple patch with the acclaimed Windows 7, but, as sure as an Xbox One follows and Xbox 360, Windows 8 wasn't so well received. Many felt it had a bipolar nature, not quite desktop OS, nor finger-friendly tablet OS.

So to 2015, and another up for Microsoft: the release of Windows 10. Taking note of the animosity towards the combined loss of the start menu and introduction of the then-Metro tiled UI, Windows 10 errs back towards the traditional desktop OS setup of the past, while making it easier to use on the many tablets now in use that are entitled to the free upgrade.

However, the tablet side hasn't been met with quite as much positive press. As it was, many of the advocates for Windows 8 were often those who used it in tablet form, but with Windows 10, users are finding where an app should for example rescale a page, it'll tend to scale with the desktop in mind and not the tablet. It's still early days, however – and, like *Star Trek* films, Microsoft usually end up with a good release following a not-so-good one.

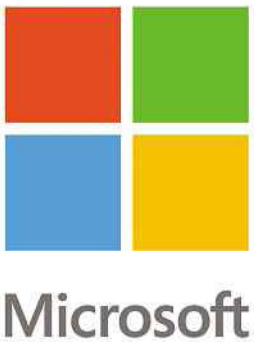
In terms of the Windows Phone 10 release, Microsoft is doing what it can to bring apps to iOS and Google/Android, hopefully leading to more day-one releases that cover all three major platforms. Project Islandwood is the platform's iOS port tools, Project Westminster handles web-based apps, and Project Astoria takes care of Android apks.

A recent leak of Project Astoria has demonstrated that most apps, with the exception of those that utilise the Google Apps framework, should run with little work. Whether this means that more will consider releasing on Windows Phone too remains to be seen, as while the translation may be relatively straightforward, the operating system's third-place market share could still be the real reason why the apps are slow to appear.

So, while the main OS is at least in good health, the future of Windows Phone isn't quite so clear. Microsoft has committed to its release, so that's not in doubt, but the scale of development may well be scaled back. The acquisition of Nokia has now caused a $7.6bn write-down – leading to Steve Ballmer's decision being branded "a monumental mistake" by industry analysts. Along with the write-down, Satya Nadella has told his staff by email that the phone business was to have a "fundamental restructuring" along with a "more effective phone portfolio (with a narrowed focus)". In real, human terms, that amounts to something in the region of 7,800 job losses, many in the phone group, which is in addition to the 12,500 that went the year before.

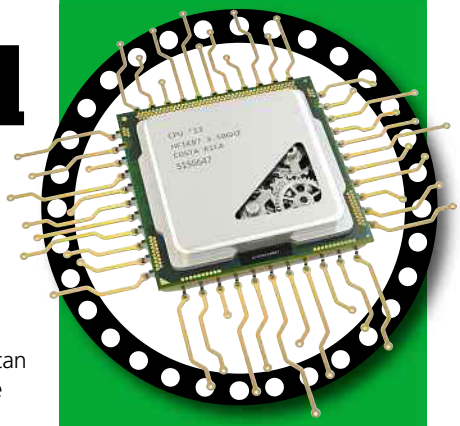
It's clear that things are having to give at Redmond, given its commercial arms are struggling behind the business aspect in a very different world to when it was omnipresent. Were it not for the continued enterprise dominance, things could be very different. These days, a public company that's on its back foot a little, such as Microsoft is, may be forced to make certain sacrifices. While Windows Phone is a fantastic platform, commercially speaking, it is still an also ran that doesn't look like it's going to catch up with the pack.

Save for a huge uptake in India or China, for example, its days could well be numbered.



Intel Inside My Mind

Andrew Unsworth rejoices as Intel's Skylake CPUs hit the headlines and the shops



Intel's funky fresh "Skylake" processors have finally been revealed and, in what is the most common-sense way to capitalise on the valuable hype of a press launch, they're now available to buy, too. This means you can go online or step into your local CPU emporium to purchase a brand-spanking-new Skylake processor right now while the product is hot, instead of one or two months after the initial hype when everyone's forgotten about them or the novelty has worn off.

Even better, the processors can be overclocked, and PC manufacturers and OEMs are producing great-value Skylake-based PCs, which means you don't have to be a system-builder to enjoy the latest technology.

Perhaps the best thing about Skylake is that it sounds like the sort of ominously anonymous organisation that James Bond would be employed to destroy, but a cool name isn't the only good thing about it. Skylake embraces new technologies and brings them into the mainstream, technologies such as DDR4 memory or faster M.2 storage and peripherals.

]Yes, these components have been around for a while, and we've seen many motherboards (Z97 boards, for example) with M.2 sockets, but these have been higher-end motherboards that only enthusiasts would own. This is especially true in the case of DDR4 memory, which has been available to use with Haswell Enthusiast (Socket 2011-v3) motherboards since last summer. Only those with sufficient funds and knowledge of PCs to build or buy a Haswell Enthusiast-based system will have used DDR4, not the ordinary person on the street.

Skylake motherboards come with DDR4 RAM slots as standard, so the vast majority of those buying or building a new Skylake PC will employ DDR4 memory. While it's true that the new Skylake chips can also use DDR3 memory, only the cheapest boards have DDR3 slots. The vast majority of Skylake boards, the ones that OEMs will use and people will buy, are DDR4-only.

As for M.2 storage, that's becoming ever more common, and will soon stop being the novel luxury it has been and become as ubiquitous as regular 2.5" SATA3 SSDs. This is a good thing, as the storage can be slotted directly onto the motherboard, which makes for a more discreet and space-efficient PC.

There are two Skylake processors currently available: the Core i7-6700K and the Core i5-6600K, and details of both can be found on Intel's Ark website (at **tinyurl.com/q5cdelm** and **tinyurl.com/nrea7gg** respectively). Both processors are unlocked, so enthusiasts can overclock them at will.

Motherboards

The new Skylake processors use a new socket called Socket 1151, which means you'll have to buy a new motherboard if you want to build a Skylake-based system. All the major manufacturers have released Socket 1151 motherboards, and they're all available in the usual ranges associated with each manufacturer. This means you can buy overclocker-focused boards, gaming-focused boards and regular 'value' boards, whichever takes your fancy.

> **"You'll have to buy a new motherboard if you want a Skylake-based system"**



Andrew Unsworth has been writing about technology for several years, he's handy with a spanner, and his handshaking skills are second to none



Ryan Lambie has loved videogames since he first stared up in awe at a *Galaxian* arcade cabinet in his local chip shop. 28 years on, Ryan writes about gaming for Micro Mart. He's still addicted to chips and still useless at *Galaxian*



Edge Of Tomorrow

Faith's back in Mirror's Edge Catalyst, EA DICE's reboot of the 2008 first-person parkour-em-up. It all looks very shiny

This week, Ryan takes a first look at EA's Mirror's Edge Catalyst, and checks out Horizons, a new season of expansions for Elite: Dangerous...

Plug & Play

"We exist on the edge between gloss and the reality" said agile heroine Faith in EA's 2008 parkour game, *Mirror's Edge*. Offering up a futuristic playground of city rooftops, the game itself trod a similar line between exhilarating dynamism and eerie unreality; you could almost feel the wind in your hair as you barely made a death-defying jump between skyscrapers, and yet the blue skies and colour-coded walls (designed to orient the player through the maze of platforms) constantly reminded you that the world you were exploring was a virtual one.

It's fascinating to see how the forthcoming *Mirror's Edge Catalyst*, EA DICE's belated return to its free-running concept, evolves the ideas first laid out in 2008. The first footage (**youtu.be/5GBVMGXXFMw**), shown off at Gamescom in Cologne, suggests a virtual world where detail has been taken away rather than added. At a time when developers seem more obsessed than ever with high-res textures and the pores of characters' skin, EA DICE has stripped the world of *Mirror's Edge Catalyst* to pure, angular forms and polished surfaces.

Here, there's almost nothing but gloss – the occasional glimpses of Faith's slight form reflected in windows seems to be the only organic form you'll regularly see in DICE's first-person platformer. The expanses of white and colour-coded platforms remain, acting like breadcrumb trails through *Catalyst*'s new, more open, spaces. These are now subtly integrated into the backdrop, seemingly lit by torchlight rather than daubed onto the walls with gaudy paint.

The mechanics of the old game still remain but, again, it's worth noting that *Catalyst*'s developers have pared things back even here. The cumbersome, almost apologetic bouts of gunplay now appear to be gone, replaced by a more free-flowing system of hand-to-hand combat; even when she's fighting off armoured security guards, though, Faith just wants to keep moving.

Of course, we can't tell how *Catalyst* handles from gameplay videos alone. The 2008 entry was a frustrating game of two halves, where the thrill of running around 20 storeys up soon fell apart when Faith was ushered indoors. By comparison, the grind of slowly hopping from platform to drainpipe felt like a war of attrition. The indoor sections still remain – in fact, the greater percentage of EA's video takes place inside a high-tech facility of some sort – but they appear to be better integrated into the design, with fewer tight spaces to navigate and more windows to dramatically crash through.

Catalyst's design director Erik Oeldahl stated at the time of the gameplay trailer's unveiling that the new *Mirror's Edge* is a reboot; "We're telling Faith's origin story," he said at Gamescom, "so the events of the first game don't really exist."

However, while EA DICE is wiping the slate clean with *Catalyst*, it's good to see that it's still exploring the same line between gloss and reality. Let's hope the mechanics that underpin it are sound.

Mirror's Edge 2 is out on the February 23rd 2016.

Online

Many developers are still feeling their way around the tricky new world of Kickstarter, with some projects failing to deliver on early promises – see Peter Molyneux's infamous *Godus* – and others failing to meet deadlines, like Keiji Inafune's *Mighty No. 9*, now delayed until 2016. Frontier Developments, on the other hand, is one of the crowdfunding







Horizons will add planetary landings to Elite: Dangerous, which is just the first in a "season" of expansions to roll out from late this year into 2016

website's major videogame success stories, having seen its *Elite: Dangerous* backed to the tune of £1.5m, and released to hugely positive reviews in 2014. As a continuation of the *Elite* legacy, the space sim has pleased both critics and fans alike.

As *Elite: Dangerous*' sales pass the 500,000 mark, Frontier has announced its future plans for the game, and they're ambitious, to say the least. At Gamescom in early August, the studio announced Horizons, which it describes as a "new season of major gameplay expansions" that will add greater variety to *Elite*'s already sprawling universe.

The first of the additions is *Planetary Landings*, an expansion that allows players to touch down on planets and hunt for derelict vessels, minerals and other treasures in a specially-designed all-terrain vehicle dubbed the Scarab. What's more, the expansion will add a smattering of ground-based combat, too, as Frontier's website explains.

"Alone or with friends, players will explore, mine and engage hostile forces as they attempt to infiltrate strongholds guarding valuable rewards. Players will explore new worlds, coasting over mountaintops, diving into canyons, landing on the surface and rolling out onto the surface in your SRV, all without loading times or breaks in gameplay."

Planetary Landings is, studio boss David Braben says, just the first in a series of expansions that will gradually roll out from the end of this year and into 2016. The only sticking point, at least for some players, might be the price. Existing players are now able to pre-order Horizons for £30, while newcomers will have to pay a bit more (£40) for the expansion and the original game. Those who backed *Elite: Dangerous*' Kickstarter campaign at its highest tiers will get *Horizons* for free as part of that deal, those at lower levels (or who purchased the game later) will have paid a total of £67.

Frontier clearly has further expansions planned, too, since it's selling a Lifetime Expansion Pass for £130, which will unlock any other additions the developer introduces over the next few years. Some players have been irked by the news, understandably, but then again, if you divide the price of Horizons by 12, its works out at about £3.35 per month – far less than the monthly subscription for *World Of Warcraft*...

Incoming

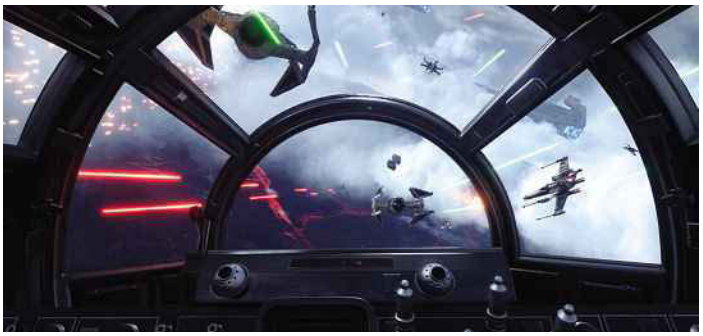
If you're looking for a quicker thrill that *Elite* can offer, *Star Wars Battlefront* probably has you covered. EA DICE has announced 'Fighter Squadron', a mode dedicated to aerial combat, with a trailer (**youtu.be/WzMKBT-9wjE**) that shows a dogfight over the lava planet Sullust featuring some of the movies' finest craft.

TIE Fighters, X-Wings, A-Wings and TIE Interceptors are shown in action, with reports out of Gamescom suggesting the mode's simple, but authentic, with players engaging in 10-v-10 battles in some of the *Star Wars* universe's most famous ships.

Until someone finally does the sensible thing and starts a Kickstarter campaign to build a real X-Wing, this is as close as we're likely to get to being Biggs.







EA DICE has unveiled another mode in Star Wars: Battlefront. Fighter Squadron will add 10-on-10 aerial dogfights featuring a whole hangar full of iconic craft

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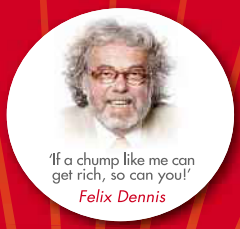
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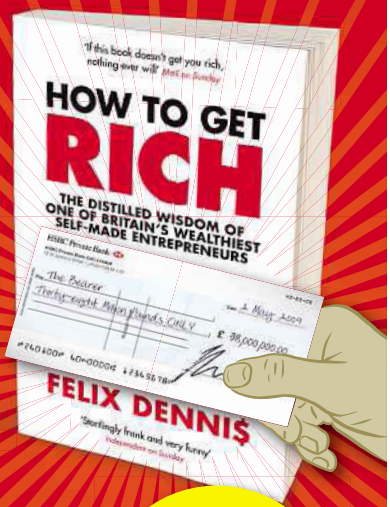


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Email: info@jmcomputing.info

2x 512MB PC3200 DDR400. Two sticks were removed from working system. £5, plus £1 P&P.
Tel: Alan (02084) 202322
Email: alan@asandco.co.uk

DDR2 memory sale.
2 x Nanua PC2 3700 256MB £6 pair,
2 x HP PC2 4200 256MB £7 pair,
4 x HP PC2 4200 512MB £10 pair
or £18 for four.
Tel: Jeremy Gill (02089) 430683
Email: arthur.pewty1@virgin.net

Asus M2N2-SLI Deluxe motherboard bundle. With AMD Athlon 64 4000 CPU, 4GB of Corsair RAM plus fan, backplate, manual and driver CD. £40
Email: david.white38@ntlworld.com

IBM/LENOVO SFF BASEUNIT. P4/ 2.8 H-T, 2GB RAM, 40GB Hard Drive, CD-Rom, 10/100 Network, sound, USB, Clean install XP-pro, fully updated, Office Suite, Anti-Virus, & all usual utilities, COA Licence Sticker & Install media, £25
Tel: Pat (07710) 348638
Email: pat4cars@aol.com

FUJITSU-SIEMENS MINITOWER. Pentium D 2.8 Dual-Core, 2GB RAM, 80GB Hard Drive, DVD-RW, Gigabit network, sound, Clean Install XP-pro, fully updated, Office suite, Anti-Virus & all usual Utilities, Legal COA sticker & System Image. £35
Tel: Pat (07710) 348638
Email: pat4cars@aol.com

DELL OPTIPLEX GX240 SFF. P4/1.6, 20GB hard Drive, 768MB RAM, CD-Rom, 10/100 network, Sound, Front USB, Clean install XP-pro, fully updated, works OK but slow by modern standards, £15.
Tel: Pat (07710) 348638
Email: pat4cars@aol.com

56kb Fax Modem External. £10.
Tel: Gordon (01314) 660205
E-mail: scobieg09@gmail.com

LG Flatron W2246S 22" monitor with power and VGA leads. No dead pixels in very good condition. £50 Buyer Collects (Verwood, Dorset)
Tel: (01202) 826057 Email: geoffandcynth@themailspot.com

2x 1GB PC2100-648. These two matched sticks were removed from one of my redundant systems. Plus one PC2700 (DDR 333Mhz) and one 512Mb PC3200 DDR400 stick. All for £5 plus £2 P&P.
Tel: Alan (02084) 202322
Email: alan@asandco.co.uk

Very rare Viking IBM 16MB Dram Card (15109 66G5109) for Compaq, IBM Thinkpad, Etc Laptop Only £20
Tel: Gordon (01314) 660205
E-mail: scobieg09@gmail.com

TP-Link 54Mbps 4-port Wireless G Router. Perfect, boxed. Model: TL-WR340G. £20 plus postage.
Tel: Gordon (01314) 660205
E-mail: scobieg09@gmail.com

Intel Core 2 Duo E4600 3GHz 775 Socket Processor. Tested and removed from a working environment. £10 inc Free Courier. Payment via PayPal.
Email: info@jmcomputing.info

Addon Wireless LAN USB 2.0 54Mbps 802.11g Adaptor. Boxed w/ manual and software: £9.
Tel: Gordon (01314) 660205
E-mail: scobieg09@gmail.com

CD Stomper CD/DVD Labelling System: Software, Labels and Label Applicator. Boxed. Unused. £9.
Tel: Gordon (01314) 660205
E-mail: scobieg09@gmail.com

DIR-615 Wireless N Router. Boxed, brand new. £30.
Tel: Gordon (01314) 660205
E-mail: scobieg09@gmail.com

Laptop DDR2 memory sale. 2 Corsair Value Select 533mhz 1GB £18 pair, 2 Hynix 800mhz 2GB £26 pair, 2 Generic 533mhz 1GB £15 pair,1 Generic 800mhz 1GB £10,1 Nanua 666mhz 1GB £, 1 Samsung 666mhz 1GB £8. Postage included
Tel: Jeremy Gill (02089) 430683
Email: arthur.pewty1@virgin.net

2x 120GB Maxtor DiamondPlus 9 Drives plus 1x 80GB DiamondPlus 10. Can be supplied with 2x plug-in caddies. Reasonable offers please.
Tel: Alan (02084) 202322
Email: alan@asandco.co.uk

HP Elitebook 8760w i7 2820QM @ 2.2GHz 32GB RAM 750GB HDD Quadro 4000M GPU. Only 2 small marks on whole machine. Cost £3500 when new. £900 ONO
Tel: (07772) 926632
Email: stedaley19@gmail.com

WD 2TB desktop HDD. Formatted ready for an OS. Runs very nicely. New laptop means desktop items must go! £40 inc. tracked postage.
Tel: (01619) 501218
Email: jmbest2@sky.com

Toshiba C500D-B-11 laptop. Almost new cost £279 will accept *£150ono*
Tel: (01217) 535324

Intel 3930K processor. Used, but not overclocked. No box or fan. £220 ono. Will ship to UK address.
Tel: Tim (01623) 624509
Email tim.stirland@btinternet.com.

Amstrad PcW 9256 in good working order with software. Offers.
Tel: John Adams (02088) 641202
Email: meeching@uwclub.net

Asus P8Z68-v LX socket 1155 motherboard. Original box 1/0 cover user guide driver disk fitted core i3 2100 CPU 3-1GHz and 8GB PC1300 memory. No fan. Working fast and fine. £125 + free postage.
Tel: (01619) 501218
Email: jmbest2@sky.com

HARDWARE WANTED

Trying to breathe life back into an old machine? Why not submit a wanted ad and see if any of the thousands of computer enthusiasts who read the magazine each week have what you're looking for?

WANTED: PC Tower case (beige colour if possible) to rehome an Amiga A1200 vintage computer. The Amiga motherboard is H 410mm x L 190mm (H 16" x L 7.5"). PSU not an issue but if available 250 watt more than enough.
Tel: Bill (07742) 061569 or (02641) 769503.

WANTED: Fractal Design Define XL full tower case. R1 (original version) in black.
Tel: (01670) 860146
Email: mm@tectron.co.uk

WANTED: Working Dot Matrix Printer in Good Condition. Thanks!
Email: printer.20.odaily@spamgourmet.com

WANTED: Acorn computer either an A5000 or A7000. Also book on teaching yourself binary.
Tel: (07817) 861011
Email: Johnhaviland73@gmail.com

SOFTWARE FOR SALE

Do you have old software that you simply don't use? Why not advertise with us and see if anyone else can make use of it – you may well be surprised to find that someone is looking for it!

Adobe Photoshop Elements and Premiere Elements 12 Full Version - Windows/Mac. Original Boxed CD with unused product key. £47.50
Tel: Ian (01932) 856971
Email: a2345@btinternet.com

PCB design software 127 layers, schematic entry, PCB entry, PCB to Gerber file converter, output to printer. £9.99
Tel: Nigel Wright (07967) 527693
Email: cresswellavenue@talktalk.net

Cyberlink PowerDVD 12 Standard. Runs under Windows 8, 7, Vista or XP. Original CD with unused product key £7.50
Tel: Ian (01932) 856971
Email: a2345@btinternet.com

Microsoft Office 2013. Original Software only £100.
Tel: Gordon (01314) 660205
E-mail: scobieg09@gmail.com

Sim City 2000. Boxed and original. Classic gaming. £15.
Tel: Gordon (01314) 660205
E-mail: scobieg09@gmail.com

Norton Family Premier 2.0. Runs under Windows 8, 7, Vista or XP, Original Symantec unused product key £15.
Tel: Ian (01932) 856971
Email: a2345@btinternet.com

Nuance Omnipage 18. OCR for Windows 8, 7, Vista or XP, Original CD with unused product key £25.
Tel: Ian (01932) 856971
Email: a2345@btinternet.com

Acronis True Image Home 2012. Bootable CD. Application runs under Windows 8, 7, Vista or XP. Original Acronis CD with unused product key £5.
Tel: Ian (01932) 856971
Email: a2345@btinternet.com

SOFTWARE WANTED

Wanted: I have a BCL 2.4g Wirless Gaming Mouse, Model: RF0P77 (3v 7ma) but no Drivers. Can someone help with a copy of the Original Drivers for this Wireless Mouse>??
cliffordevans603@btinternet.com

Wanted: Driver disc for Toshiba L30-11D PSL33E laptop. Laptop useless without drivers but only worth £40, so cannot pay a lot.
Tel: John Udall (01384) 824494
Email: john.udall@blueyonder.co.uk

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• Be wary of anyone who insists on you paying by the above methods if in doubt, get us to check them out by mailing editorial@micromart.co.uk

• Keep copies of all correspondence

• When sending out goods, at the least obtain a certificate of posting from the Post Office

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30 Cleveland Street
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aaron@micromart.co.uk

Please try to keep your queries brief and limit them to just one question per letter, simply so we can squeeze in as many as we can each week. Please include relevant technical information too.

Aaron

Windows 10 Uncertainty

Now that Windows 10 has arrived, I've been debating whether or not to upgrade to it from Windows 7. I avoided Windows 8, as I just didn't like the new style and interface, but I see that Windows 10 has made some effort to change this. As it's also free, I'm more tempted to give it a try.

Before I do so, I'd like to know how easy it is to go back to a previous version of Windows, should I find that I simply don't like Windows 10. Once I upgrade, am I then stuck with Windows 10, or can I revert back to my older OS, Windows 7?

I'd appreciate your advice on this matter, and will hold off on my upgrade for now.

Jed

Windows 10 does, indeed, make a lot of changes to the way it operates, and although opinion is still very much divided on the OS, it would appear as though it's winning over some critics who previously disliked Windows 8's approach. A lot of potential users are still unsure ahead of the upgrade though, which is certainly understandable, given the operating system's often rocky history.

Luckily, you're not tied to Windows 10 for good, and if you don't like it, you can easily revert back to an older version. If you have an install disc of your previous version, you've got no problems at all, as you can format and reinstall as much as you like, just be sure to backup your data before you upgrade, lest you need to wipe and start again.

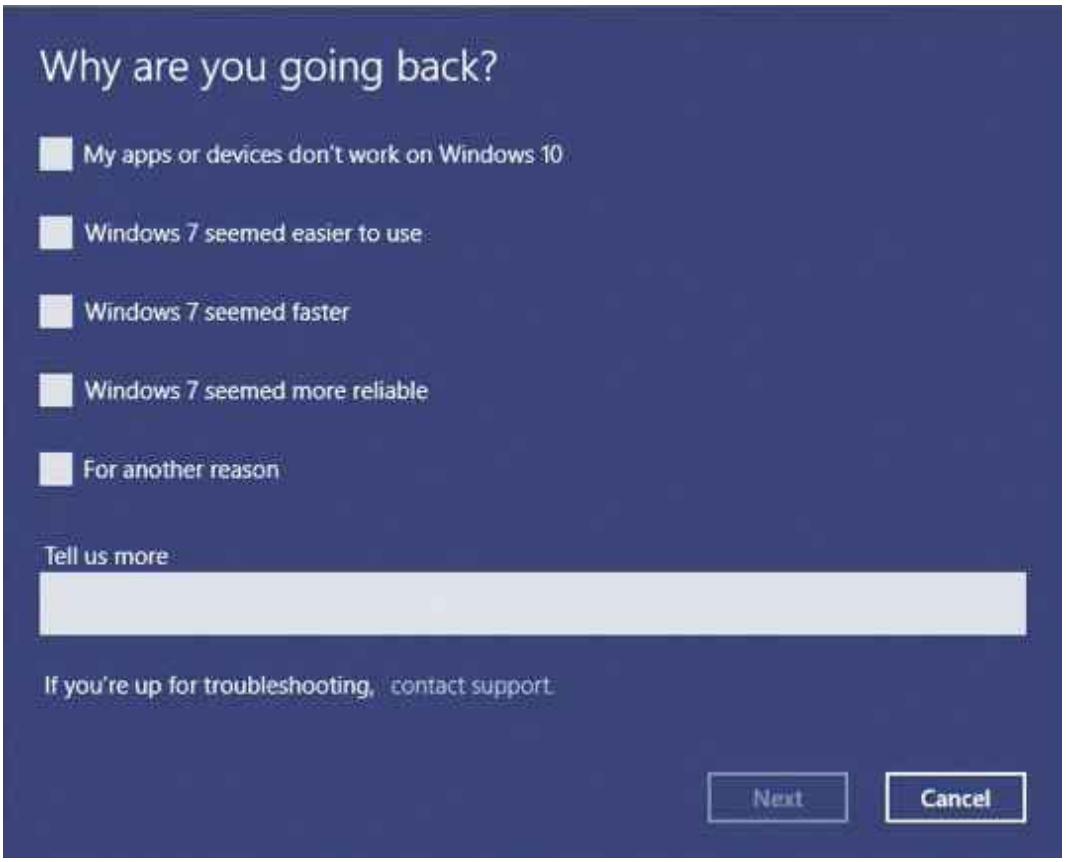
This format shouldn't be needed, though, as Windows 10 has a built-in feature that allows you to remove the latest OS and return to your previous version. All you need to do to use this feature is click the Start Menu and then go to Update & Security, and then Recovery. Here you'll find an option that lets you go back to your previous version of Windows (the option will change depending on your previous installed OS).

The caveat to this is a month-long time limit, or the use of Disk Cleanup. After a month, or if you've used Disk Cleanup and removed the old Windows installation (which Windows 10 retains for this purpose), you'll likely have issues returning using this method, which simply reverts to the older OS, retaining all of your data. If this is the case, the option to return to the previous version of Windows will be absent.

The prior version of Windows is stored in a Windows.old folder on the hard disk, and it's this that gets removed. You could try to back up this folder, or at least restore certain data from it, but it's best to use the correct methods to restore your older version.

If this folder is deleted, you'll need to use your original install disc to revert to Windows 7, or possibly your OEM recovery partition, if it still exists. Otherwise, you may have to buy an older copy of Windows.

If you try Windows 10, but don't like it, you can roll back using the built-in option



Let's Get Physical

I want to upgrade to Windows 10, but as my Internet connection isn't what you'd call stable, I'm a little apprehensive, and I don't want to run the risk of any problems by updating over the Internet, which appears to be the method Microsoft is recommending.

I was hoping that there would be a local install option for Windows 10, one that would let me download the whole thing and install it offline. I can re-download a setup file, but if I run into connection loss and possible corruption of an install, this won't be as easy to recover from. I'm sure you can understand my concern.

So, I'd like to know what you suggest. How should I go about updating my existing copy of Windows (8.1) to 10 without having to do so online?

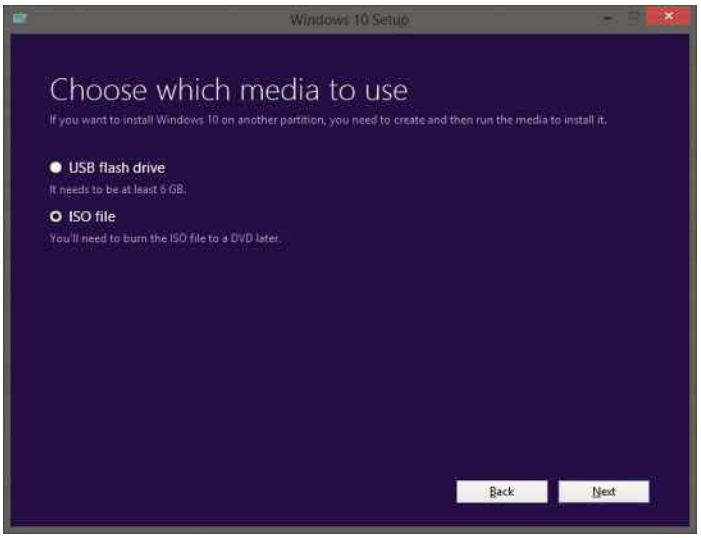
Paul

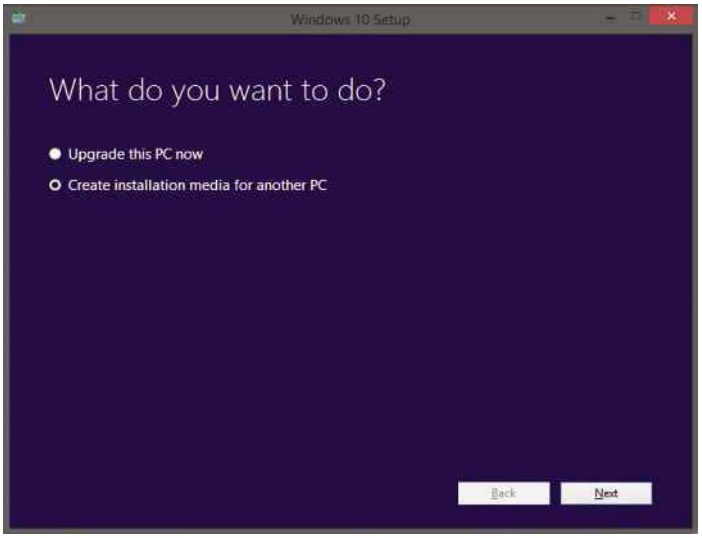
If your Internet connection is unreliable, it's common to run into issues with such online installation procedures, and you're right to be concerned. If there's one install you don't want to mess up, it's your operating system.

Luckily, Microsoft has made is easy enough to upgrade without having to do so online, and you can actually download a full copy of Windows 10, which you can then turn into an ISO, which in turn can be burned onto a disc and used as install media.

*To do this, you'll need to visit **bit.ly/1KwZCCq**. Here you'll find instructions on how to download the Windows 10 install (both 32- and 64-bit), and you'll also be able to acquire the Windows 10 media creation tool, which is used to actually create the install media once you've downloaded the files needed.*

Simply run the tool and you'll have the option to either update using it, or to create install media for another PC. Do this, and you can select the OS language, the version of Windows 10 (Home, Pro, etc), and whether the copy will offer 32-bit, 64-bit, or both. Once you've selected your options, choose to make an ISO file to burn to a DVD, or use a USB flash drive. You'll still need your existing Windows product key to upgrade, of course, but the install, once the media is created, will be local, and you won't have to worry about your connection dropping part way through.





▲ ***Download Windows 10 files and install tool to create your own install media***

Which ISO?

I've decided to use the home-made ISO option to upgrade to Windows 10, but as I'm new to the whole ISO business, I'm not really sure what I need in order to do this. I'm not sure how to create the ISO, and once I have it, what to do with it. Can you advice?

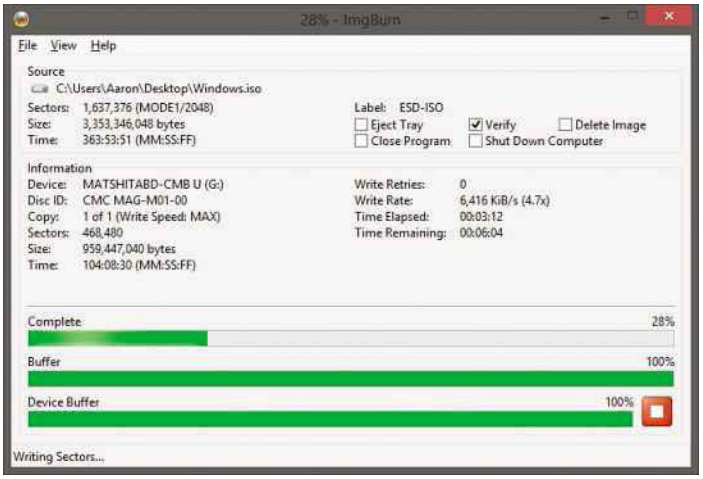
Lou

As I've actually covered in the above response to Paul, the easiest way to create the Windows 10 ISO is to use the custom media creation tool from Microsoft. Visit the same address I supplied to Paul and download the Windows files and the creation tool, then use it to create your ISO.

*Once you have the ISO, you'll then need to use it, which you can do in a number of ways. You can use an image mounting tool, such as Daemon Tools (**www.daemon-tools.cc**), you can copy it to a bootable USB flash drive (again, this is possible using the media creation tool), or you can burn it to a disc. There are plenty of free image burning tools that can burn ISO images to disc, including ImgBurn (**www.imgburn.com**). Using programs like this is easy, all you need to do is select an image, and click burn.*

When the disc is burned, it'll function like a normal install disc, so just use it as you would any Windows install disc.

▼ ***Programs like ImgBurn can be used to easily create custom install media***



ASK JASON



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While we try to cover as many questions as we can, we regret that Jason cannot answer your questions personally, but he'll cover as many as he possibly can each week. Please ask one question per letter and remember to include the full specification of your computer, including its operating system.

Jason

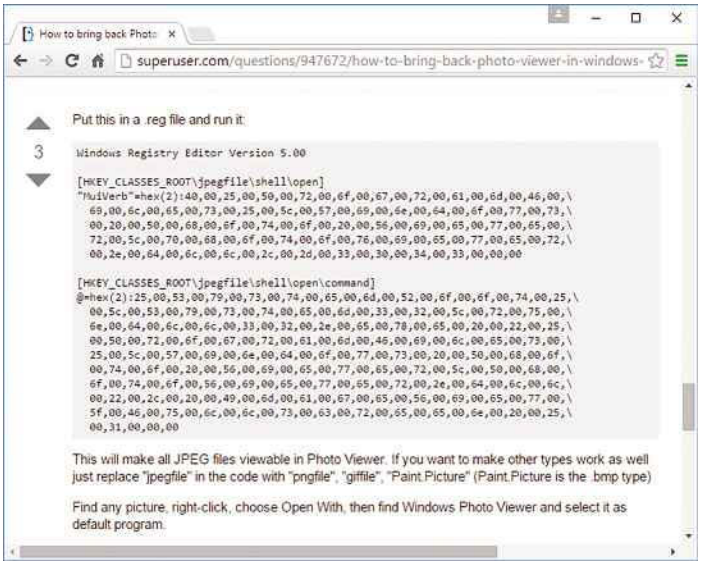
Image Problem

I've just upgraded to Windows 10. I thought I'd struggle – I'm coming from Windows 7 – but so far I've only found one problem. When I open a .tif file, it launches Windows Photo Viewer, which is good. However, when I open a .jpg file, it launches the new Photos app, which is bad.

Firstly, this doesn't show the file name in the title bar. Secondly, if I zoom into an image, I can't skip forward or back to another until I zoom out again. It's rubbish!

No problem, I thought – I'll just make Photo Viewer the new default, but I can't figure out a way to do it. If I right-click a .jpg file and select 'Open with', for example, Photo Viewer isn't an option. Even if I then select 'Choose another app', it's not there, and it's still not there if I drill right down by clicking 'Look for another app on this PC'. What's the solution? Why does it have to be this hard?

Alastair, Gmail



Should I just pretend I understand this?

Where on earth is Photo Viewer in Windows 10?



Photos app has some decent editing functions, but as a simple image browser it's not a patch on the old Photo Viewer.

And a patch is what you're after. You need to patch, or hack, the Windows registry. The snag, you see, Alastair, is that Photo Viewer can't be run directly. There's no .exe file. Rather, it's a product of 'shimgvw.dll', which has to be invoked via 'rundll32.exe' (it's called that even on 64-bit systems, by the way).

*You need to pop along to **goo.gl/rsmJek**. Scroll down to the text shown in the picture I've printed, and copy and paste this into Notepad, including the 'Windows Registry Editor Version 5.00' bit at the start. Save the file with a .reg extension – 'viewer.reg', perhaps. Finally, double-click the file, then click Yes, Yes, and OK.*

> **When I open a .jpg file, it launches the new Photos app, which is bad**

When you next double-click a .jpg file, you'll see the familiar dialogue box that allows you to decide which program to launch. Back in the list will be Windows Photo Viewer. Select it, put a tick against 'Always use this app to open .JPG files', and click OK.

Now, I haven't a clue what that registry hack actually does, and I can't say with any certainty that it won't break something somewhere else.

It's working for me, and I've not noticed any problems, but even so – apply it at your own risk. There's no doubt that Photo Viewer is a better image browser than Photos, but, my word, it looks a right old mess in Windows 10. It just doesn't fit in with the new design ethos. You have to wonder why Microsoft hasn't simply got rid of it altogether.

PS – If you want to make Photo Viewer the default image browser for other file types, you'll find the instructions just below the text you had to copy.

PPS – Regular readers may remember that in issue 1,373 I had a bit of a pop at Linux, making the point that it often seems necessary to type gobbledygook into a terminal window. Oh, the irony!

In A Bad Mode

I've been reading about the security flaw that's been found in some Intel chips. From what I understand, it allows rootkits to be hidden and run without a user's knowledge. I've got a Core i7-920 – is this one of the chips that's affected?

Robin, Plusnet

I'm afraid your chip is indeed affected by this issue. The flaw was apparently introduced with the Pentium Pro (1995) and was only fixed with the arrival of the Sandy Bridge architecture (2011). Your Core i7-920 uses the Nehalem architecture, which predates Sandy Bridge. No-one seems to know if any AMD chips are part of the mess.

The flaw allows rogue code to be executed in a chip's SMM (System Management Mode), an area that's supposed to be sealed off and totally inaccessible, even invisible, to any other area. A superbly informative article on the subject is available at The Register: ***goo.gl/dnWtm9****.*

It's not clear exactly how Intel could have overlooked the flaw for so long. Conspiracy theorists are suggesting it wasn't a flaw at all, but a deliberate backdoor for use by US security agencies. I'd like to be able to say such a notion is ridiculous, but who knows?

Should you be worried? Not really. There's no workaround (not for mainstream users), but the problem remained unfixed for sixteen years and I've never read a single report about anyone falling foul of it. Then again, because any code running in an SMM is immune to anti-virus software, when you think about it, how would an exploit ever be detected? I think at this point, with so much of our personal information online, we just have to accept that privacy and security can always be compromised if someone tries hard enough and it's worth their while.

Knox Blocks?

I'm hoping to experiment with custom ROMs on my Galaxy S5, and I've been reading about Samsung's Knox tool. I've not installed this, but there's a reference to it in the phone's settings. There are a lot of scare stories, so I'd be grateful of some advice. Could Knox 'brick' my phone if I install a custom ROM? Is installing a custom ROM even possible if Knox is there? And what's the Knox flag? If it's triggered, will my phone's functionality become limited in some way?

G. Weaver, Nottinghamshire

Knox gives users two separate Android environments: standard and secure. In the secure environment, only certain apps are available, and there's no Play store. Everything's locked down. Also, nothing created in one environment can be seen in the other. The idea is that users can have just the one phone for both home and work.

To use Knox you have to install an app, but the infrastructure behind it is present by default on nearly all Samsung phones and tablets running Android 4.4.x (KitKat) or later (some devices got it at Android 4.3.x (Jelly Bean)). I think the oldest Knox-enabled phone is the 4G variant of the Galaxy S III, model GT-I9305.

So what's the Knox flag? Well, this can have one of two states: 0x0, for untriggered, or 0x1, for triggered. You can check the state by hopping into the Play store and installing the oddly named Knox Status Samsung (not an official Samsung app).

Installing a custom recovery image (such as ClockworkMod), flashing any ROM that overwrites the bootloader (nearly all ROMs, then), and even just rooting (though some workarounds are appearing) – all these will normally trigger the flag.

The only guaranteed 'safe' ways to upgrade a Knox-enabled device are by an OTA update (over-the-air) or through Samsung's wretched Kies software. The flag will usually be triggered even if you flash a totally stock ROM using Odin (a tool leaked from Samsung itself), as that will typically overwrite the bootloader.

On a phone with a Qualcomm Snapdragon SoC (system-on-a-chip), the Knox flag is an e-fuse, and when triggered it's physically 'blown'. Resetting it is therefore impossible, and I don't think anyone's found a way to fool software into displaying 0x0 when the state is really 0x1.

*On a phone with a non-Snapdragon SoC – which usually means it's got one of Samsung's own Exynos jobs – the flag is thought to be software-based, though that might apply only to older SoCs. I understand this flag *can* be reset in some instances, though it all seems rather hit-and-miss.*

So what happens if the flag's state changes to 0x1? For starters, Knox becomes disabled. If it's already been set up, any content held in the secure environment is lost. Also, at least in the US, your phone's warranty becomes void. I don't think that's true in the UK – surely such silliness wouldn't be allowed? Don't bank on it, though.

If you've no interest in Knox and your warranty's already expired, the Knox flag probably isn't an issue. Even when triggered, it doesn't limit a phone in any way other than described above. You'll still be eligible for regular updates, for example, and you'll still be able to flash new ROMs. For more information, head to ***goo.gl/JoAdF5*** *('Myths and Truths about Knox'),* ***goo.gl/03mgek*** *(a discussion on rooting), and* ***goo.gl/ZDYX7j*** *(the official list of Knox-enabled devices).*

Is Samsung's Knox a blessing or a curse?



Crowdfunding Corner

This week it seems that cubes are on-trend, as we examine a pair of projects which have just one thing in common: their shape

The Nipper

Smartphone battery packs have two main flaws. One: they're usually huge. Two: they contain li-on batteries that age and drain about as badly as the one in your phone. There's no perfect solution to the problem, but at least one person has come up with an alternative, and it's funding now on Kickstarter.

The Nipper is a British-made charger that allows you to use a pair of AA batteries to recharge your smartphone. The primary benefit – aside from being much smaller than most battery packs – is that if you find yourself in a low-power situation, it's very easy to get hold of batteries on short notice. All you need is an open supermarket or newsagent. That requires a lot less forethought than charging a portable battery pack hours before you know you'll need it. The charger itself snaps into a cube when not in use, is small enough to fit on a keyring and features a fabric strap.

It's currently compatible with any microUSB device, and an Apple Lightning version is in development. Because it uses household batteries the charging capacity isn't huge – a modern smartphone can gain about 20% per pair of batteries – but on the other hand, that's enough for any emergency. The early bird offers have sold out, but you can still get a standard Nipper for just £15 in white or black, or £20 for a classic version with leather strap and gold-plated magnets. The £6,000 goal seems well within reach, although unfortunately there's quite a wait involved – units ship in April 2016.

URL: kck.st/1f5zXTb
Funding Ends: Thursday, September 10th 2015

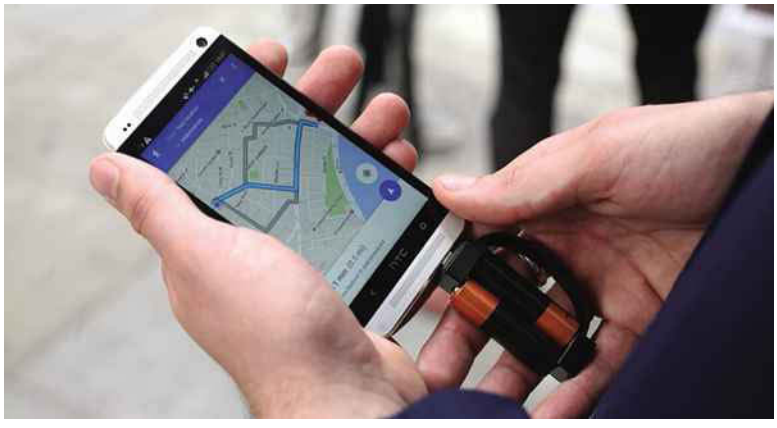
Stacks

As anyone with a passing interest in technology will know all to well, keeping cables tidy on your desk is a difficult thing to do. It's even more difficult to do if you want it to look good at the same time as being practical. Stacks, however, could provide part of a solution, however. They're small metal cubes, which act as cable tidies but which their makers describe as "a work of art." We're not sure about that. it's hard to deny that they look good, though.

Each of the heavy, dense, cubes – available in brass or steel – contains a small groove which can accomdate a cable, but is heavy enough to hold its position and prevent plugs from slipping off desks once they're disconnected. You can stack the Stacks on top of one another, as the name suggests, or put them side-by-side – or, indeed, both. If you're a fan of minimalism or just looking for a simple alternative to rooting around on the floor for that charger lead, this looks like it could be just what you're looking for.

At time of writing you can still get a cube for as little as $20 (£13) or two for $35 (£22.50), though supplies are limited to a thousand sets apiece. Again, they aren't going to be available until April 2016 but, though the campaign is a two-month one, it's already passed its initial goal so you shouldn't have to worry about not getting one at all. Unfortunately, though, there is lots of waiting around in store with this project, unfortunately – but it may be worth it for design like this.

URL: kck.st/1UDHNDF
Funding Ends: Saturday, October 10th 2015





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App Of The Week

Kolektio

We look at an interesting new media sharing app

Coordinating the sharing of photos from a specific event can be a bit of chore. If, for example, you are out with a group of friends at a party, you may want to collate an album of all the pictures you collectively took during the evening, but if it takes time for all of your friends to get around to uploading their contributions, it can become a labourious, frustrating, process. There is an answer, though, in the form of Kolektio for both Android and iOS devices.

Auto-sharing

Kolektio is a new app that allows you and your friends to take images of an event, and automatically upload them to a private collection. This way you can have all of you snapping away at that party, and the next day you won't have to wait for your images to upload or for others to upload theirs.

There's more to it, though. Kolektio has a secure network connection to its cloud services: a free version with 1GB of storage, a Basic version with 2GB of storage for €4 per year, and a Premium version with 10GB of storage included for €10 per year. Within each package you're able to share your 'moments' with unlimited people, take unlimited photos, and create unlimited moment albums. Furthermore, each moment created allows you to share the contents with whoever you decide.

Setting Kolektio up is simple enough. You create a moment, adding a start and end date and time, then you add the other contacts and those who will be with you at the event to the shared moment. Once that's done you set the sharing of any images taken during those times, whether you want to approve before uploading or whether you just want the app to instantly upload every image from the camera during those times.

Finally, at your leisure, you check through your photos – and those of your invited contributors – of the event, with no images from before or after the designated times finding their way in there to slow things down.

Features At A Glance

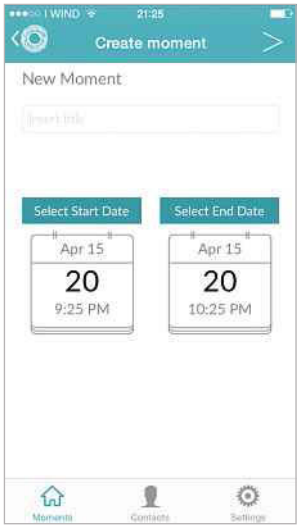
- Reliable and Secure Platform
- Free, but charges for extended storage plans
- Everything is perfectly organised for future viewing
- Collect and share your media easily

Conclusion

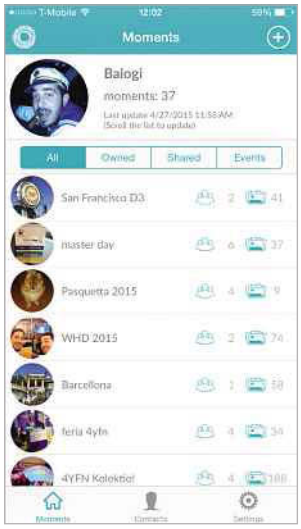
As Matteo Masserdottu, co-founder of Kolektio says. "We're all so connected in this digital age that we can view photographs of people we barely know in countries we do not live in. One of the main problems still remain that we don't ever get to see our own experiences due to images being deleted, lost or forgotten. We created Kolektio to solve this problem and ensure people can capture the moments in their life that are important."

Kolektio is certainly an interesting app, and one that will no doubt prove beneficial to many. We know of a few people who these days don't bother with wedding photographers, but rather opt for everyone's view of the day through their own taken pictures. Kolektio could easily help and be easily setup for this particular type of scenario.

Give it a go for yourself and see what you think, you'll find more details over at the Play Store (**goo.gl/rWTSJH**), or on iTunes, (**goo.gl/HpH2G0**)



Create your moment around the date and time of an event



Add the people who you want to share with, and who else will be posting



And set the upload policy for anything taken during that time. Easy

Logging Off

The cycle of development in the world of computing is brutal. A few weeks ago, I covered the first 14nm fifth-generation Intel Core processors, and before that chip has cooled down, we're already seeing new sixth-gen parts. Haswell is barely two years old, Broadwell a year (desktop parts a month…) and now Skylake is available at retailers!

But before anyone starts prising out their old chips for a shiny new Core i7-6700K, there are a few things you need to know about these chips, not least that they require a new motherboard architecture.

Having moved systematically through the board numbering to Z97 and X99, the sixth-gen processors will need the new Z170 chipset (or H170 and Q170) and a new LGA 1151 socket. But as significant a change is also, like X99, the fact that Intel seems determined to shove DDR4 down our throats.

Actually, the chip also supports DDR3L, but I can think that will probably only be on laptops, with desktop users being sent down the DDR4 route.

That's not an incremental change for most users, because where they might be able to budget for a new CPU, with Skylake they'll also be shelling out for a new motherboard and memory to match. And if you want this system to sing really sweetly, then a PCIe SSD is also a tactical purchase.

If that's not enough of a gouge, you'll probably have to pay for Windows 10, unless you have a full retail version of Windows 7 that you can upgrade for gratis.

Intel always does these things with a high degree of confidence, generally ignoring the times that it entirely backfired (RDIMMs) and customers balked at total system overhauls.

That said, it's had X99 in the market for some time now, and I've still seen relatively little evidence that system builders are building significant amounts of this platform. And in the same vein, DDR4 products are still hugely outnumbered by DDR3 at most memory retailers.

Perhaps Skylake and the 100 series motherboards will start to change that, but it's probably not going to happen overnight, even if you can buy both of those today.

Oh, and in case you were wondering how long this technological wonder was going to be current, Intel has already put Kaby Lake on its 2016 roster and announced the 10nm Cannonlake (gen 7) a year after that.

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That's a mixed message in my book, because on one hand it's asking that the buying public embraces its latest creation, while internally it's already done with Skylake and is heading elsewhere as fast as it can.

If Intel can't wait to get down the road, then the temptation is to think likewise and wait for something better, even if we all know that the ultimate conclusion of that path is still running Windows 2000 on a Pentium II.

Personally, I'm still using a very functional and punchy Haswell-based system, and the justification for junking it seems paper thin at best. In fact, once more Skylake chips enter the market and Intel decides to clear the channel of old stock, I might be tempted to shift up from Core i5 to a Core i7 processor, because the silver lining to every upgrade cloud is that it makes the old (but good) hardware even cheaper.

Mark Pickavance

LAST WEEK'S CROSSWORD

Across: **7** Dendrologists, **8** Voodoo, **9** Pliers, **10** Spammer, **12** ASCII, **14** MS-DOS, **16** Hyponym, **19** QWERTY, **20** Truism, **22** Prosopography.
Down: **1** Memo, **2** Ad Idem, **3** Korolev, **4** Morph, **5** Sirius, **6** Eternity, **11** Password, **13** Syntagm, **15** Ogress, **17** Ocular, **18** Nymph, **21** SOHO.

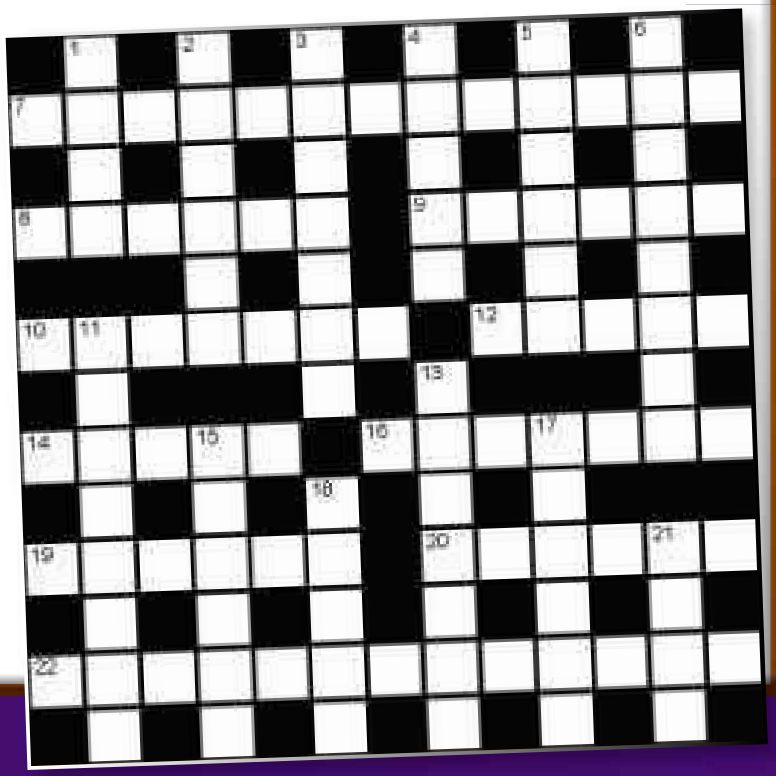
THIS WEEK'S CROSSWORD

Across

7 A word or phrase that is not formal or literary and is used in ordinary or familiar conversation. (13)
8 Former pupils or students of a particular school, college or university. (6)
9 A person of nearly the same age as another. (6)
10 A plane figure with at least three straight sides and angles, and typically five or more. (7)
12 A family of United States missiles and space launch vehicles originally designed in the late 1950s. (5)
14 A garment with pressurised pouches that are inflatable with air or fluid. Worn by fighter pilots and astronauts to enable them to withstand high gravitational forces. (1-4)
16 A project or plan not proceeded with either temporarily or permanently. (7)
19 Software that automatically displays or downloads advertising material such as banners or pop-ups when a user is online. (6)
20 In card games the suit that has been declared to rank above all other suits for the duration of the hand. (6)
22 A small round building with a rotating angled mirror at the apex of the roof, projecting an image of the landscape onto a horizontal surface inside. (6,7)

Down

1 Rotary motion of an object around its own axis. (4)
2 Lacking grace in movement or posture. (6)
3 Either of the two celestial points at which the celestial equator intersects the ecliptic. (7)
4 The density of typed or printed characters on a line. (5)
5 A desktop computer or workstation that is capable of obtaining information and applications from a server. (6)
6 Increase in extent or intensity. (8)
11 A hard, dark, glass-like volcanic rock formed by the rapid solidification of lava without crystallisation. (8)
13 London's underground railway system. (3,4)
15 An electronic or other device, which records pictures of something. (6)
17 A date or occasion at which a new product or publication is introduced to the public. (6)
18 The change of a radioactive substance, particle, etc. into another by the emission of radiation. (5)
21 An interface on a computer to which you can connect a device. (4)



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In Next Week's Micro Mart*

- How to get the most from multi-GPU setups
- Could today's artificial intelligence advances lead to something more sinister?
- Whatever happened to Second Life?
- Plus the usual mix of news, reviews and advice

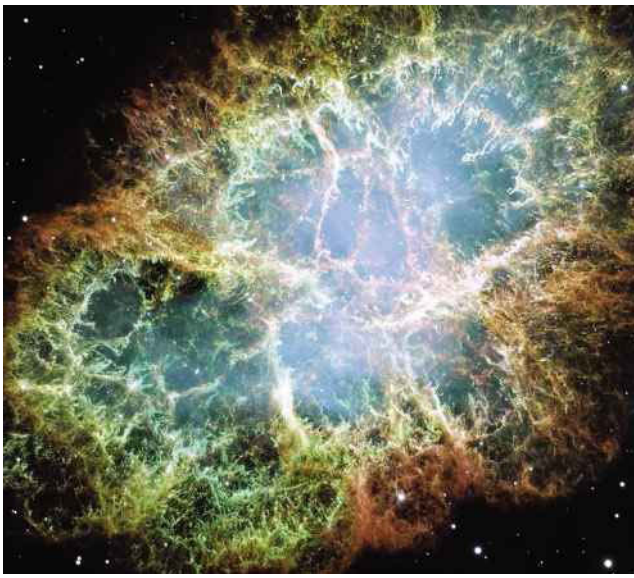


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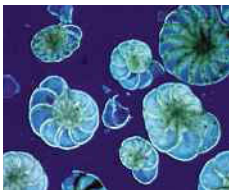


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